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PRACTICAL WINERY & VINEYARD

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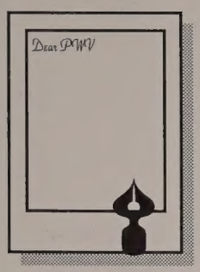

Dear Editor:

In California, both the grape-related industries and the research institutions have gone through dramatic changes in recent years. The industry has grown dramatically in the last 20 years and now includes many new participants. It has become a far more complex endeavor in terms of production and marketing, and it faces new and ever-expanding environmental and labor challenges.

At the same time, the research institutions have experienced changes in staff, funding, and priorities. Researchers have acquired many new responsibilities and have less time to focus on applied research. In addition, university administrations have set requirements for career advancement that emphasize publication of research results in prestigious basic science journals.

These changes have strained the relationship between the industry and the research institutions to some extent. The contributions of past applied research and the need for continuing research is not appreciated by some in the industry, although it is through technological advances that the industry maintains competitiveness. The value of applied research, both to the industry and society as a whole, appears to be under-appreciated by some at the research institutions where basic research is now emphasized.

Past research efforts have resulted in vast technological advances in grape growing and grape processing. Vine training, pruning, fertilization, irrigation, canopy management, pest management, and vineyard mechanization are a few of the practices that have been improved and refined since prohibition, due to applied research. The result has been dramatic increases in fruit yield and quality, and decreases in production costs.

The wine industry in other nations, including Australia, South Africa, and several European countries, have realized the value of applied research. In these countries, close relations between industry and the research institutions are being forged, and focused, long-term research programs are being developed to improve and refine industry-related technologies. If we wish to remain competitive, we must do the same in the U.S.

We need to move beyond our current system where most applied research projects are conceived in a "piecemeal" fashion, each an entity onto itself. Projects should be composed of experiments and trials that are focused on answering questions or providing solutions to problems faced by industry. Individual trials should build on previous work and provide the logical link for future trials.

Trials should be designed so their results can be integrated whenever possible by using as many common factors and design features as possible. In this way, we can identify effects that hold over a broad range of conditions from those that are site-specific (by using appropriate statistical techniques). Also, results that can be integrated easily could provide the basis for production models.

One possibility might be a vineyard development model with which a grape grower could test different vine densities or rootstocks for effects on yield and fruit maturity after entering the material inputs (e.g. vines, stakes, wire, PVC pipe, etc.), variety, growing area, and expected crop value.

We in industry must take the initiative. In order to develop the research programs that will give our industry the technology to realize its full production and quality potential, we need to develop a funding mechanism that lasts for several years, not just from one year to the next.

We need to set our research priorities and solicit the best qualified researchers to help us develop and execute priority programs. Finally, we must develop a means of controlling the quality of the research so that it satisfies our expectations.

Sincerely,
Stan Grant, Viticulturist
John Baranek, Grape grower

"The horse is here to stay, but the automobile is only a novelty–a fad."

President of Michigan Savings Bank advising Henry Ford's lawyer not to invest in the Ford Motor Company.

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WINERY & VINEYARD

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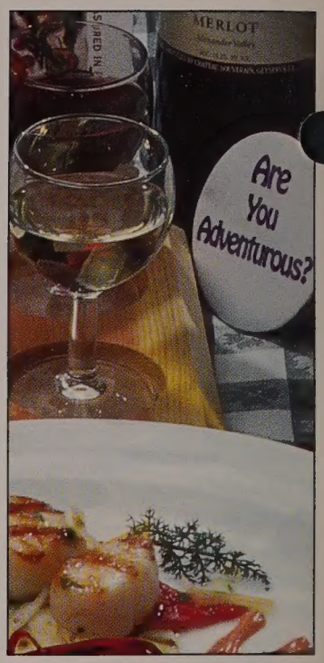

COVER: *Adventurous wine/food promotion*
Photo *by George Rose*

SUPPLIER SHOWCASE
PACKAGING
BOTTLES • CORKS • CAPSULES • SHIPPERS

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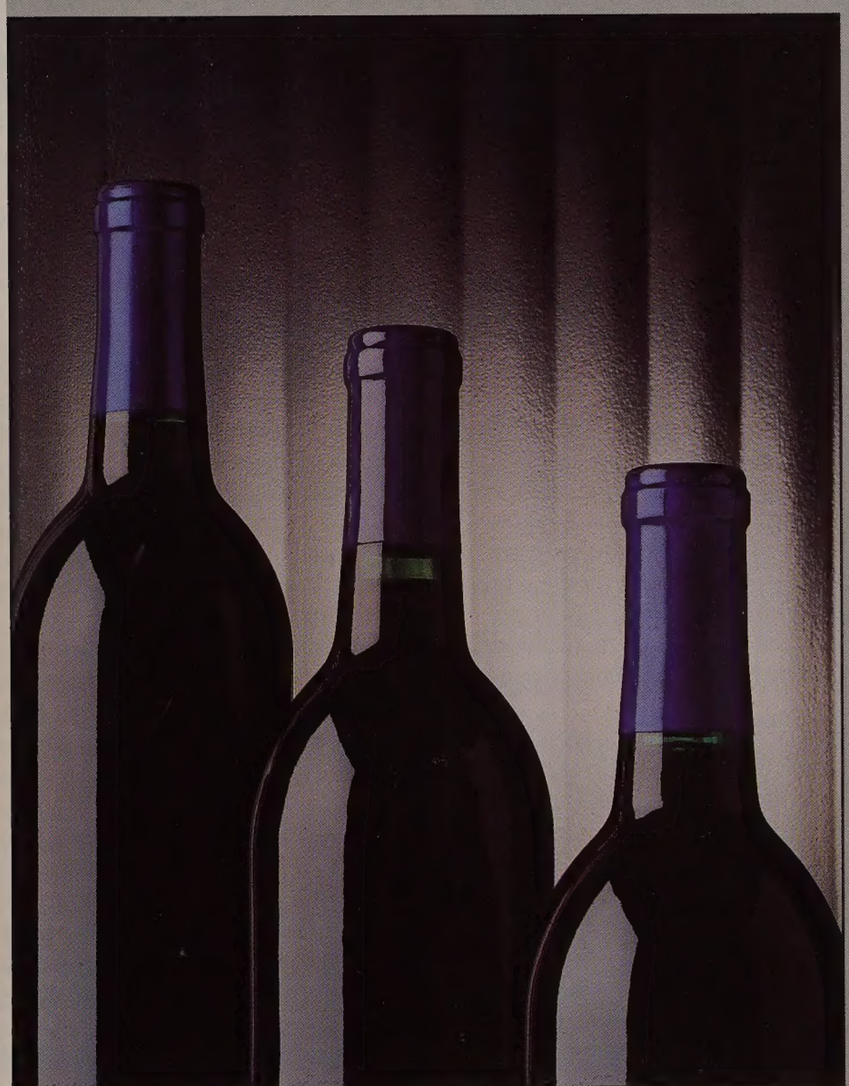
ON TOP OF THE WEST COAST WINE BUSINESS FOR TEN YEARS.



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FETZER VINEYARDS & RUSTY PELICAN

Assertive approach asks consumers "Are You Adventurous?"

A server presents Rusty Pelican customers with a wine tasting tray (left) and an appetizer platter (right).

by Millie Howie

An exciting new wine marketing idea is boosting wine sales in the chain of 16 Rusty Pelican restaurants in the United States, since February 1994. Their new "Are You Adventurous?" food and wine promotion produced with the help of Fetzer Vineyards has succeeded in making more consumers wine-aware and resulted in a healthy increase in wine sales.

The spark-plug that ignited the idea was Alene Waxler, southern California sales representative for Brown-Forman Beverage Co. (distributor for Fetzer Vineyards).

"Some time ago," she recalls, "I came up with an idea for a food and wine presentation, matching small tastes of a group of wines, with specially prepared appetizer-size foods. I told Fetzer Vineyards Chef John Ash about it, and he recalled a similar idea. Together we designed a prototype, and I took it to Leslie Miller, Rusty Pelican beverage consultant."

Waxler chose Rusty Pelican because she felt their guests are interested in wine and she felt she could count on first-rate commitment from the company if it elected to implement the program.

Waxler proposed offering restaurant patrons a tasting tray with two-ounce samples of four wines as an alternative to wine by-the-glass. Partnered with the wine sampler would be an appetizer platter presenting generous tastes of four different dishes created by John Ash to complement the wines.

The success of the program began with careful planning and coordination by Leslie Miller in every aspect. Before it was introduced in five 200-seat southern California Rusty Pelican restaurants, testing, tasting and training prepared the way.

Rusty Pelican's Miller, Wayne Miscotti (vice president of operations), Jim Meyers, (director of operations), and Tim Busald (director of operations, southern region) traveled to Fetzer Vineyards and met with John Ash and Bernadette Bryne (Fetzer Vineyards education director). They served as a tasting panel and chose two Fetzer wines — Fetzer Barrel Select Zinfandel and Barrel Select Chardonnay — and two wines from the Rusty Pelican wine list — Markham Sauvignon Blanc and Chateau Souverain Merlot — as the four wines for the tasting tray.

Ash and the management team experimented with flavors and textures and came up with several recipes focused on each wine. Everyone tasted and revised the pairings, and voted for the final selections. Then Ash assembled the completed tasting plate presentation.

Tools

Meanwhile, Waxler came up with the "Are You Adventurous?" theme and gathered the tools. She designed durable pine trays with four inserts for the glasses. Miller found the wine glasses and a grapevine easel to hold a colorful "Spice of Life" poster announcing the program at each restaurant entrance. Miniature versions of the poster placed on each wine tray describe the wines and the concept.

Each restaurant received an initial shipment of 50 trays and 200 glasses, but the program has been so popular that the company has purchased more of the program elements. Each server wears an "Are You Adventurous?" theme button and works from a "script" prepared by Miller.

Training

To launch the event, Bernadette Byrne and Leslie Miller conducted training sessions with the staff members of the southern California restaurants. Training attendance was mandatory for all managers, food servers, and bartenders. Four sessions, each two hours long, were held at properties in La Jolla and Long Beach. As the program has expanded, additional training meetings have been conducted in Arizona.

Each participant is given a "text book" written by Byrne, which reinforces all of the training elements. It presents comprehensive descriptions of all the foods and wines and gives examples of what influences a diner's choice. A list of quick tips for pairing foods with wines also explains why some combinations work and others don't. The four wines and their recommended food companions are arranged on the platters in identical clockwise position. There is an incentive program for the food servers.

At each restaurant, Byrne discussed John

Ash's reputation and how he developed the concept and recipes. All food servers and managers tasted the wines, alone and with the food items. The staff members were so enthusiastic that, following the meetings, they came up with suggestions to refine the program, including the idea of offering the food items as entrees in addition to appetizers.

How it works

The "Spice of Life" poster is prominently displayed at the restaurant entrance where Rusty Pelican guests wait to be seated. The host/hostess seats the customers and gives them the menu which includes an invitation: "Are you Adventurous?"

The invitation notes that "Variety is the spice of life.... A variety of flavors is what we deliver in this unique 'Adventure into Food & Wine.' We've assembled a wine tasting tray showcasing four of California's finest varietal wines. This tray offfers a taste of Markham Sauvignon Blanc, Fetzer Barrel Select Chardonnay, Chateau Souverain Merlot, and Fetzer Barrel Select Zinfandel. John Ash, one of California's most influential chefs and Fetzer Vineyards Culinary Director, has created an exciting appetizer platter to complement/enhance the flavors and texture of each wine on the tasting tray. So be Adventurous. Enjoy the pleasures of perfectly matched food and wine — we've removed the guess-work!"

At their table, patrons are approached by a food server wearing the "Are You Adventurous?" button who explains the program. By this point, many patrons are caught up in the excitement of the presentation.

Ideally, diners will be intrigued enough to choose both the wine tray and tasting platter. Each may be ordered independently, however. The tasting tray, with four glasses, equal to eight ounces of wine, costs $5.50. The Rusty Pelican plans to change the wines and appetizers offered in the program regularly to spark new interest, but the company has committed to including two Fetzer wines on the tasting tray.

The Rusty Pelican wine list, which changes twice/year, usually showcases 14 wines priced from $3.50 to $5.50 per six-oz. glass.

The Markham Sauvignon Blanc is the only Sauvignon Blanc offered by-the-glass and is priced at $4.25/glass. The Markham and one other Sauvignon Blanc are offered at $23/bottle.

The Fetzer Chardonnay is available for $5.50/glass and is one of five Chardonnays offered by the glass between $3.75 and $5.50. The Fetzer Chardonnay is priced at $23.00/bottle; the 14 other Chardonnays offered cost between $15 and $32 per bottle.

The Chateau Souverain Merlot is available for $5.50/glass in addition to another Merlot offered for $4.50. The Souverain Merlot is priced at $23/bottle as are two other Merlots.

The Fetzer Zinfandel is the only Zinfandel offered at $4.50/glass or $15/bottle.

The complete Rusty Pelican wine list offers 36 wines between $15 and $32 per bottle and two French Champagnes at $45 and $95 per bottle. The 36 wines consist of: two white Zinfandels, two Rieslings, one white Meritage, four sparkling, one Gewurztraminer, one Barbera, five Cabernet Sauvignons, one Pinot Noir, and the Merlots, Chardonnays, Sauvignon Blancs and Zinfandel described above.

The $9.95 appetizer platter includes scallops on fennel with lemon-tarragon vinaigrette; crab cakes with red pepper aioli; Japanese marinated salmon; and seared ahi tuna with pepper and lavendar crust.

The crab cakes can be ordered separately as a $6.95 appetizer plate. The other appetizer items can be ordered individually as entree items served with clam chowder or salad, cous cous, and sourdough bread: Japanese marinated salmon at $17.95; ahi tuna at $18.95; and grilled scallops at $16.95. In addition to these three, Rusty Pelican offers about 25 other entrees, including pastas, seafood, poultry, and beef priced between $11.95 and $22.95.

"This promotion has really exploded and put Rusty Pelican on the cutting edge of food establishments," says Waxler. "People are coming in just because they heard about it."

"The program has received the most enthusiastic support I have ever seen for any promotion," she continues. "Everyone on the staff, from top to bottom, embraces this new direction in the restaurant."

Tracking

Rusty Pelican's computerized tracking system shows that sales of wine by the glass increased an average of 23% in the five restaurants during the first month of the promotion.

Rusty Pelican rates the program very successful and plans to take it to Illinois next. "We are eager to expand into other locations," says Miller, "and are working with Bernadette Byrne to get training underway in the other units outside of California." ■

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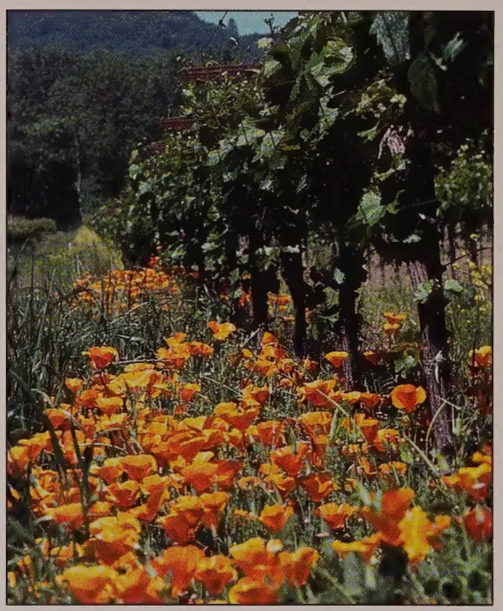
COVER CROPS for North Coast vineyards

by Glenn McGourty



Cover crop of California Poppies (left); mowing (top right); perennial clovers, no till (lower right).

With the increasing interest in sustainable agriculture, vineyard managers are rediscovering the benefits of growing cover crops. Improving soil structure and fertility, vigor control of vines, reducing soil erosion, discouraging weeds, and encouraging beneficial insects and spiders are all good reasons to plant cover crops. Additionally, many cover crops are aesthetically pleasing, and add to the vineyard landscape.

Many cover crop species were originally introduced into California as livestock forages. Our knowledge of how these plants grow and what conditions they are adapted to is extensive. The following summarizes the research and grower experiences observed by the author in selected North Coast vineyards.

Covercrop species selection

Just as there is no universal winegrape cultivar, rootstock, or trellis system, there is no universal covercrop for all vineyards. Choices will depend on management goals. Anyone interested in covercrops should conduct their own test plots to see how different selected species perform in their management system.

Cover crops should be chosen on their suitability for a production system. Their physical stature, water use, competition with vines, and ease of growth are all examples of why they would be chosen. The frost hazard of a site may influence your cover crop choice as well.

Nitrogen fixation

Leguminous covercrops when properly inoculated with Rhizobium bacteria have the ability to fix up to 300 lbs of nitrogen/acre per year (far more than the 30 lbs N/year that is probably needed by most vineyards.) To obtain maximum nitrogen input from legume cover crops, they should be mowed and incorporated at their full bloom, then keep the soil moist for three weeks. (In the North Coast, this usually occurs in late April to mid-May.)

Maximum nitrogen release occurs three to six weeks after incorporation. With typical management systems, this often coincides with the bloom period of grapes. If you are growing leguminous covers in vineyards planted to cultivars such as Merlot or Pinot Noir, which are sensitive to flower shatter when high nitrates are present in the soil, you may wish to only mow the cover crop when it flowers, then incorporate it later after the vineyard blooms and sets.

Self-seeding winter annual covercrops such as subterranean clovers and burr clover, are often used in no-till vineyards. These covers die in late spring and early summer. Nitrogen is leached through the soil with summer irrigation or the first fall rains.

Perennial leguminous covercrops generally add very little nitrogen into the vineyard system unless they are disked or chemically mowed. They cycle most of the nitrogen back into their own canopy. If grasses are added to the system, little nitrogen leaches beyond the upper 14 inches of soil. In fact, excess nitrogen can be absorbed by grasses used as cover crops in areas where excess nitrate leaching is a concern.

Nutrient cycling

Legumes are efficient at extracting potassium and phosphorus from the soil profile. They may help to make these nutrients more available to vines by complexing them into exchange sites in the organic matter, especially when calcium is present. Once incorporated into organic matter, potassium may be more available to grape vines (experiments are underway to investigate this theory.)

Members of the mustard family can develop deep taproot systems that, upon decomposition, aid in water penetration. Additionally, they are reported to cycle nutrients from lower in the soil profile back to the upper horizons, especially calcium, potassium, and phosphorus. Mustards have been a long-time favorite of vineyardists, due to their early bloom, dependable seed set, and general attractiveness. Often, mustards are present already in natural covers (i.e., weeds.)

Organic matter accumulation

The greatest destroyer of organic matter is tillage, especially when bare soil is left exposed to the hot sun. Spring incorporation of covercrops followed by bare soil all summer generally results in little accumulation of organic matter. If the goal of covercrop program is to accumulate soil organic matter, no-till systems in which grasses are used to form either a living or dry mulch will probably be the best ap-

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Delayed incorporation of mowed cover crop.

proach to building organic matter.

Grasses, however, can be competitive with grapevines. Choosing the proper species for the site becomes critical to avoid devigorating the vineyard. No-till systems are best for protecting the soil from erosion, but many growers object to their appearance. No-till may not be the best option in dryland situations, or where water is extremely limited.

Mixes

Many growers may wish to mix two or more covercrop species to insure that at least something will grow if fall weather conditions are not favorable for germination. There may also be advantages from the point of view of habitat for beneficial insects, weed competition, nitrogen fixing, or general compatibility of the crops selected.

Legumes and grasses are a natural for mixes. They complement each other well, especially in perennial cover crop systems, due to their cycling of nutrients, root morphology and effects on the soil. Sustainable agriculture encourages diversity of species in the farm ecosystem. Species diversity in cover crops helps to prevent the creation of a monocultural "sward" (the area between vine rows covered with plants) that might become susceptible to disease or insect problems.

No-till vineyards

Preventing soil erosion and saving energy are two obvious benefits to no-till vineyard floor management. Another benefit is firm footing in wet weather. Growers report fewer insect and mite pest problems in no-till vineyards. Drawbacks include appearance, and possible competition between the cover crops and vines. Dry land vineyards on shallow soils are not good candidates for no-till covercrops.

On deep fertile soils where excess vigor is a problem, competitive cover crops can slow down vines, compete with weeds, and provide beneficial insect and spider habitat. There are perennial species that survive well from season to season without summer irrigation, allowing drip systems to irrigate the vines, and not the covercrops. Irrigation or favorable rainfall is important in establishment.

Annuals vs. perennials for no-till vineyards

There are well-adapted species in both categories suited for North Coast vineyards. When conditions allow the establishment of either self-reseeding annuals or perennials, they can save significant energy in the form of reduced tillage and mowing, while providing firm footing all year.

The down side of perennials is their competitiveness with the vines (if not chosen properly,) and the attractiveness of some to gophers, voles, and other rodents. When properly chosen and adapted, many growers find them the best possible choice due to their ease of maintenance. For instance, a dense stand of hard and sheep fescue grows only three inches tall, needs only to be mowed annually, and yet can compete with both summer and winter weeds.

Annual species that reseed themselves regularly are generally not as competitive as perennials, but weather doesn't always favor their regeneration each season. If early October rains occur, they generally sprout and grow well, especially subterranean clovers. However, if rains are late, they may not sprout. Overhead post-harvest irrigation in early maturing vineyards can help regulate germination. Early maturing annuals are certainly recommended when minimal competition is desired between covercrops and vines.

The following section includes some general recommendations for different vineyard situations:

A. Vineyards that will be disked annually

Low fertility sites:

Legume cover crops can improve the nitrogen status of low vigor vineyards. Just as importantly, including grasses can greatly improve the soil's physical struc-

Rhizobia and Nitrogen fixation

Winemakers appreciate the role that yeasts play in converting grape juice into wine. Farmers who grow leguminous covercrops have the same respect for Rhizobia (bacteria that colonize legume roots), in turning atomospheric nitrogen into usable forms of N for plants.

When legume seeds germinate, rhizobia enter the roots through minute hairs, then reside inside nodules which form on the roots. Therefore, it is desirable to have plenty of rhizobia bacteria nearby to insure that this process occurs. In order to insure success, legume seeds must be inoculated prior to planting with the appropriate strain of rhizobia. There are several ways to accomplish this.

Smaller seeded legumes, such as clovers, medics and alfalfa, are available precoated with the rhizobia and a protective layer of calcium carbonate mineral. While seed coating companies warrant the viability of the bacteria for 18 months from the day of inoculation, university researchers find that additional fresh rhizobia applied to the seed just prior to planting usually results in better nodulation and growth of the legumes.

Certainly, the longer the seed remains in the seed dealers' stock, the greater the chances that the rhizobia coatings will weaken, even though the seed can remain viable for up to three seasons. If the seed is left unplanted, it is always best to re-inoculate with fresh bacteria at planting time the next season.

Rhizobia is quite perishable, and must be kept away from heat and sunlight. You should order the appropriate strain of rhizobia for your legume cover from the seed dealer well in advance of planting. The shelf life of these products is short, and frequently they are not kept in stock.

There are several different systems for inoculating uncoated seeds. Most involve a sticker that allows the rhizobia to coat the seeds. Often, the rhizobia is suspended in fine peat moss powder. Stickers include alginates, milk proteins and other colloidal substances.

Don't omit the important step of seed inoculation! It could mean the difference between success and failure.

ture, improving water and air infiltration, and moisture storage.

Mixes of purple vetch, Austrian Winter Pea, and Fava Beans, blended with small grains or annual ryegrass will perform well if the site is reasonably well-drained. These combinations germinate well under cool conditions, and are therefore suited to dryland vineyards that depend on rainfall for the water supply.

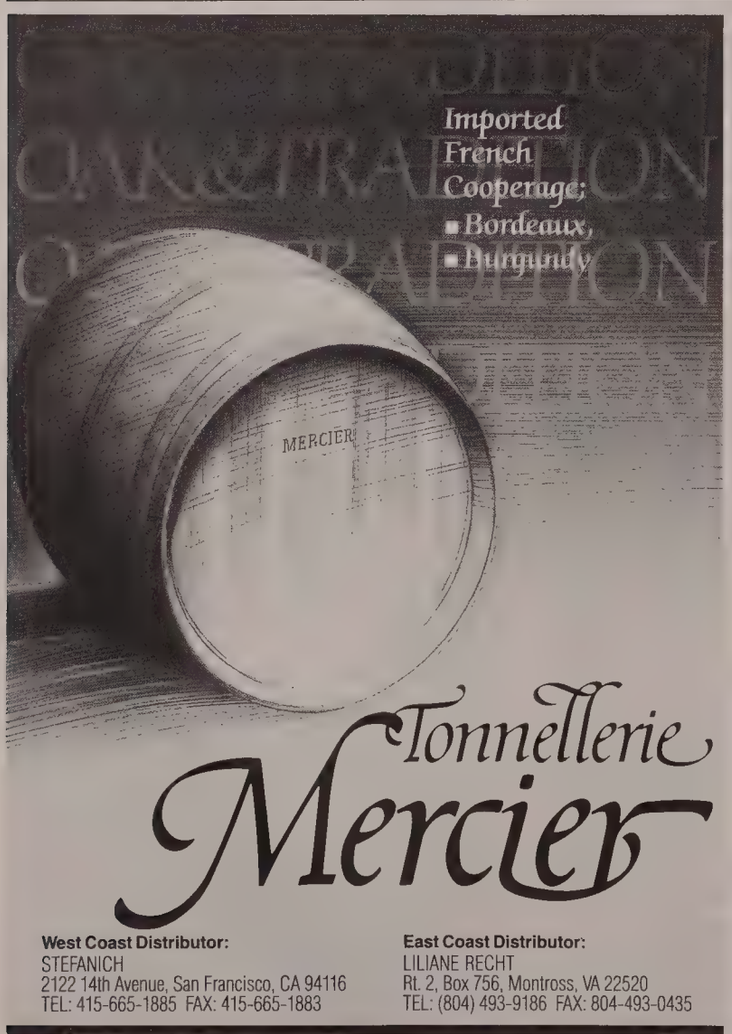
These covers tend to form large statured swards that can be impressive, but may require mowing prior to incorporation. They can create a frost hazard, and may grow into trellises if not watched closely in the spring. These are good covercrops to begin working with because they generally are quite easy to establish, and grow well nearly every rainy season in the North Coast.

Other species that are useful include crimson clover, berseem clover, burr and barrel medics, and subterranean clover. These can be mowed and then incorporated later after they dry to prevent excessive release of nitrogen. These plants are generally lower statured, but under ideal conditions are capable of producing nearly as much biomass as the larger statured covers. Swards composed of these species are generally easy to manage with mowing, and don't entangle the trellis, or creep where they are unwanted.

For poorly drained vineyards, berseem clover is the most water-tolerant of the covers. It can survive underwater for up to three weeks in its native Nile River Delta. It grows vigorously, produces nitrogen when properly inoculated with Rhizobium, and can be mowed several times in the spring, producing more biomass than if left unmowed.

TABLE I Relative seedling vigor of selected covercrops

HIGH	MODERATE	LOW
Annual ryegrass	Subterranean clover	Purple needle grass
Vetch	Burr medic	Ladino clover
Winter peas	Rose clover	Strawberry clover
Oats	Red fescue	Birdsfoot trefoil
Barley	Hard fescue	White clover
Clover	Sheep clover	Pine bluegrass
Wheat	Alfalfa	Molate red fescue
Zorro fescue	Orchard grass	
Perennial ryegrass	Radish	
Tall fescue	California brome	
Crimson clover	Blue wildrye	
Mustard	California barley	
Phacelia		
Fava beans		
Berseem clover		



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On the other extreme, rose clover does very well on rocky, dry sites where little soil moisture is available, and a low statured cover is desired. Rose clover is recommended as a pasture species on south-facing slopes with shallow soils.

Annual ryegrass, Blando brome, and Zorro fescue are also seeded in low fertility sites with or without the low statured legumes. Quick to germinate, they are useful for erosion control, especially on terraced vineyards.

Moderate to high fertility sites:

Mixes of small grains and annual ryegrass are often planted with or without winter peas, vetch, and bell beans. On high fertility sites, mow first and gradually incorporate to avoid excessive nitrogen release in the soil profile. Don't disk it in immediately. Wait three or four weeks, lightly disk first, open your disks wide the second time around.

B. Vineyards with no-till cover crop

Low to moderate fertility sites:

Subterranean clover, burmedic, barrel medic and rose clover, with small amounts of zorro fescue or blando brome. These can be dry-seeded so they will germinate with the first fall rains. Mow in late winter to discourage competing weeds, and encourage tillering. Let seeds completely mature before final mowing to provide sufficient seed bank for following year. Cultivars should be matched to soil type and rainfall, as there is a wide range of maturity in the clovers.

Moderate to very fertile soils / adequate water:

Any of the preceding annual covercrops will certainly grow well, but watch that you aren't causing excessive vine vigor if only legumes are planted. For a grassy cover that competes moderately well with weeds, perennial ryegrass, red fescue, hard fescue, and sheep fescue are all well-suited.

Native grasses in the vineyard

The "Big Three Natives," *California Brome, Blue Wildrye* and *Meadow Barley,* are well suited in vineyards planted on deep fertile soils. These grasses exhibit excellent seedling vigor, outstanding competition with summer weeds, and are compatible with native wildflowers, such as California Poppies, Tidy Tips, Farewell-to-spring, and others. These are handsome plants that form an open sod, and also attract numerous beneficial insects and spiders. Many view planting these species as an act of conservation to preserve the native flora of California.

Other native grasses that are commercially available include the graceful Purple Needle Grass (which some say should be the California State Grass), the delicate Molate Red Fescue, Pine Bluegrass, and California barley. These are somewhat trickier to establish, and are not as competitive as "the Big Three."

Growers have noted that California native grasses extract moisture from the soil profile at a slower rate than exotic perennial and annual grasses, and are not believed to be as competitive with vines as other grassy cover crops. These grasses are cool season perennials that grow mostly before the warm portion of the year when soil moisture is still plentiful from rainfall. In warmer climates, California native grasses go very dormant with the onset of hot, dry weather. On the North Coast, the summer dormancy is not as pronounced.

Management of these grasses is not particularly difficult, but a few key steps should be taken for their longevity:

1. Plant in early fall to take advantage of fall rains for development.
2. Mow in early spring to a height of four inches to suppress winter weeds, and promote tillering of the developing grasses.
3. Let native grasses flower each spring before mowing short for the summer. Perennial grasses fair much better if you do not mow them until late spring, as they accumulate the carbohydrates in their root systems that brings them out of dormancy in the fall when rains begin again. Short mowing after flowering (around June 15th) prolongs their life.
4. After establishment, overseeding with annual or perennial clovers can help provide nitrogen to the native covers. Likewise, low rates of nitrogen fertilizers (up to 30 units/acre of N applied in April) can also help to invigorate and prolong the life of a native grass sward.

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Ladino clover, birdsfoot trefoil and strawberry clover will all do well in these stands. These perennial covers grow strongest in mid- to late-spring, and often will dry up and turn brown in mid-summer, greening up again in fall and winter.

If overly vigorous vines are a problem, it may be desirable to plant covers that become competitive with vines. California brome, blue wildrye, tall fescue, orchardgrass, perennial ryegrass, meadow foxtail, and smooth brome are all examples of grasses that can form dense, competitive turf that will use nutrients and water. Cover crops compete well with weeds, and can devigorate overly vegetative vines.

Legumes are sometimes included into the mix to provide nitrogen for the grasses — little nitrogen ends up in the grapevines. Grower experiences in Mendocino County have shown that this system works well. If the cover is too devigorating, disking or chemically mowing every other middle can be used as an adjustment.

Planting requirements

Species vary greatly in their ability to germinate and grow, which is described as "seedling vigor." Generally, larger seeded plants are easier to establish (Table I).

The lower the seedling vigor, the more difficult it is to establish a cover crop. Quality seed bed preparation, preplant fertilizers, soil amendments, and time of planting need to be considered. In some instances, low seedling vigor covers have "enforced dormancy" or "hard seeds," which means that a low percentage of the seed may initially germinate, with the rest to follow at a later date. Many of the small seeded legumes exhibit this phenomena.

Planting schemes

To offset the expense of establishment, many growers plant every other row every other year to give the benefits of cover-cropping while spreading the risk and expense. This also allows for easy placement of prunings for shredding in the non-planted row.

Some winter annuals, such as Cahaba White Vetch, fair poorly in the North Coast when planted more than one season in the same place. Planting alternate rows each year provides a one-year fallow period which can improve the performance of these covers. Mixtures may help to overcome this problem.

Tips for establishing covers:

1. *Pretillage ripping:* If the vineyard has been disked for many years on soils prone to compaction, it may be useful to shallow rip 12 to 18 inches deep in the middles corresponding to wheel traffic areas. The ground should be fairly dry to create some shatter of the compacted zones. If conditions allow, August is a good month to perform this operation. If the soils are fairly moist, little benefit will result from deep tillage.

2. *Fertilizing for the cover crops:* In the North Coast, soils are frequently acidic and low in calcium. Most of the legume covercrops respond favorably to liming and phosphorus fertilizing. The exact amounts to be applied should be determined by a soil test. In many areas, sulfur is also deficient, and applications of popcorn sulfur are useful. Typical rates applied are one ton of pure lime/acre, along with 200 lbs of 0-36-0-20 fertilizer/acre. These compounds should be applied pre-tillage to insure that they are well-mixed with the

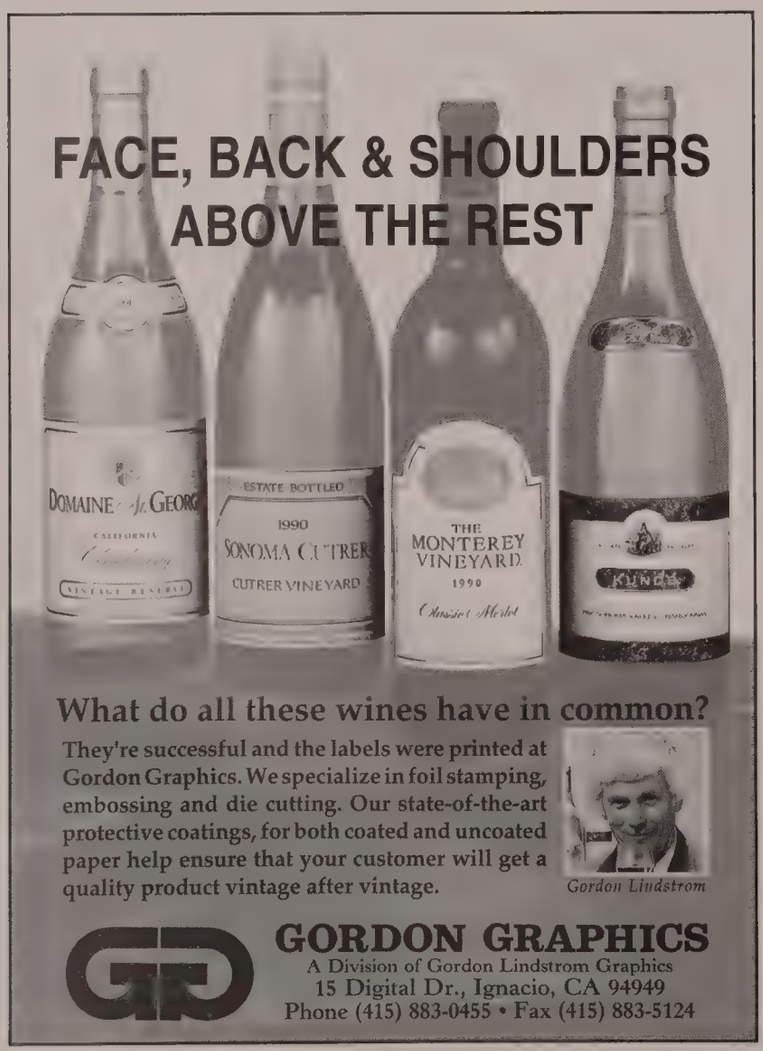
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Figure I
ANNUAL COVER CROPS FOR TILLED VINEYARDS

COVER CROP	Purple Vetch	Common Vetch	Lana Vetch	Field Peas	Berseem Clover
SCIENTIFIC NAME	*Vicia benghalenis*	*Vicia sativa*	*Vicia dasycarpa*	*Pisum sativum*	*Trifolium alexandrinum*
SUGGESTED CULTIVARS	Purple Vetch	Common Vetch	Lana Vetch	Magnus; Miranda; Austrian Winter Peas	Multicut
SEEDING RATE (pounds/acre)	50-60	60-75	50-75	20-70	15-20
POTENTIAL NITROGEN (pounds production/acre)	150	150	150	120	200
TOLERANT TO TRAFFIC ?	no	no	no	no	yes
WEED COMPETITION	good to excellent	good to excellent	good to excellent	good to excellent	good to excellent
REQUIRES SPRING MOWING ?	no	no	no	no	yes
FERTILITY REQUIREMENTS	Ca, P, K, S	Ca, P, K, S	Ca, P, K, S	Ca. P, K, S	Ca, P, K, S
CANOPY HEIGHT	sprawling 18"-24"	sprawling 18"-24"	sprawling 12"-24"	sprawling 18"-24"	medium 12"-24"

COVER CROP	Barley	Oats	Bell Beans (Fava)	Mustards	Phacelia
SCIENTIFIC NAME	*Hordeum vulgare*	*Avena sativa*	*Vicia faba*	*Braassisa spp.*	*Phacelia spp.*
SUGGESTED CULTIVARS	UC476	Cayuse; Swan	Diana, many	many	Phaci
SEEDING RATE (pounds/acre)	60-90	60-90	190-200	5-12	15-30
POTENTIAL NITROGEN (pounds production/acre)	0	0	10	0	0
TOLERANT TO TRAFFIC ?	no	no	no	no	yes
WEED COMPETITION	good to excellent	good to excellent	fair to good	good to excellent	very good
REQUIRES SPRING MOWING ?	no	no	no	no	no
FERTILITY REQUIREMENTS	N, P	N, P	Ca, P, K, S	N, P	N, P
CANOPY HEIGHT	tall 30"-60"	tall 30"-60"	tall 30"-60"	low-tall 12"-60"	low 12"-14"

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soil for quicker uptake and use by covers.

Grass covers such as small grains, ryegrass and others respond well to 25 lbs/acre of nitrogen applied in the fall at the time of planting, and again in the early spring if needed. Calcium nitrate, urea and ammonium phosphate are frequently used. Caution: when planting a grass/clover mix, avoid or limit nitrogen fertilizers which encourage grasses to the point they will shade out clovers.

3. *Seedbed preparation:* For all covers, disk or rototill the area to be seeded twice when soil moisture conditions favor the creation of a well-granulated, soft, friable seedbed. Then level with the appropriate equipment and ring roll to make the soil firm and smooth. The objective is to create a seedbed where the seed can be placed in a precise depth and then pressed into contact with the soil.

4. *Time of planting:* Best germination occurs when soil temperatures are about 70°F. In the North Coast, mid-September to mid-October is prime time for covercrop seeding. It is also prime time for grape harvest, so some years it becomes difficult to plant, due to scheduling conflicts.

Seed germination begins with moisture, either arriving as rain or applied by the grower. Sprinkler irrigation after harvest is the best way to start the cover crop, but unfortunately, not all vineyards are equipped with sprinkler systems.

Cover crops can be dry-seeded before harvest, then irrigated as soon as the grapes are picked. Seeding after October 15th becomes risky due to cooling soil temperatures, slow germination, and frost. Generally, grasses will germinate fine through mid-November, but the small seeded legumes will fail to grow. In cooler areas, frost and cold wet soils can cause extensive damping off of seedlings, even if they have successfully germinated. Consequently, the earlier in the fall that you seed, the more success you will likely have in establishing these covers.

Spring seeding of perennial grasses and legumes has also worked well for growers who can sprinkle-irrigate the crops up. Perennial covers typically grow best during the spring months of May and June before weather becomes hot.

5. *Seeding:* Both broadcast and drill-type seeders can be used to seed covercrops. Generally, larger seeds that need to be planted below ½-inch should be drilled. Legumes and other spreading covers frequently are drilled, as you can often get better stands with less seed.

Figure II
ANNUAL COVER CROPS FOR NON-TILLED VINEYARDS

COVER CROP	Subterranean Clover	Rose Clover	Crimson Clover	Zorro Fescue
SCIENTIFIC NAME	*Trifolium subterraneum*	*Trifolium hirtum*	*Trifolium incarnatum*	*Festuca megalura*
SUGGESTED CULTIVARS	Karridale; Koala; Trikkala; Junee; Clare	Hykon; Overton; Wilton	Dixie, Flame	(same)
SEEDING RATE (pounds/acre)	20-30	15-20	20-30	10-15
POTENTIAL NITROGEN (pounds production/acre)	30-60	30-60	30-60	0
TOLERANT TO TRAFFIC ?	yes	yes	yes	yes
WEED COMPETITION	good to excellent	fair to good	good to excellent	good
REQUIRES SPRING MOWING ?	yes	yes	yes	no
FERTILITY REQUIREMENTS	Ca, P, K, S	Ca, P, K, S	Ca, P, K, S	N
CANOPY HEIGHT	low 6"-12"	low 6"-12"	medium 12"-24"	low 6"-12"

COVER CROP	Blando Brome	Annual Ryegrass	Bur Clover, Bur Medic
SCIENTIFIC NAME	*Bromus mollis*	*Lolium multiflorum*	*Medicago polymorpha*
SUGGESTED CULTIVARS	(same)	Gulf, Common	Santiago, Circle Valley
SEEDING RATE (pounds/acre)	10-12	60-90	15-20
POTENTIAL NITROGEN (pounds production/acre)	0	0	30-60
TOLERANT TO TRAFFIC ?	yes	yes	yes
WEED COMPETITION	good to excellent	excellent	good to excellent
REQUIRES SPRING MOWING ?	no	no	yes
FERTILITY REQUIREMENTS	N	N	Ca, P, K, S
CANOPY HEIGHT	low 6"-12"	low 6"-12"	low 6"-12"

Figure III
PERENNIAL COVER CROPS FOR NON-TILLED VINEYARDS

COVER CROP	Strawberry Clover	White Clover	Birdsfoot Trefoil	Tall Fescue*	Perennial Ryegrass*	Red Fescue
SCIENTIFIC NAME	*Trifoluim fragiferum*	*Trifolium repens*	*Lotus corniculatus*	*Festuca arundinacea*	*Lolium perenne*	*Festuca rubra*
SUGGESTED CULTIVARS	O'Connors Legume; Salina	New Zealand, White Dutch	Empire; Viking	many	many	many
SEEDING RATE (pounds/acre)	5-15	5-15	5-10	15-25	40-50	15-40
POTENTIAL NITROGEN (pounds production/acre)	30-60	30-60	30-60	0	0	0
TOLERANT TO TRAFFIC ?	yes	yes	yes	yes	yes	yes
WEED COMPETITION	fair to good	fair to good	good to very good	very good to excellent	very good to excellent	fair to good
REQUIRES SPRING MOWING ?	yes	yes	yes	no	no	no
FERTILITY REQUIREMENTS	Ca, P, K, S	Ca, P, K, S	Ca, P, K, S	N	N	N
CANOPY HEIGHT	low 3"-12"	low 6"-12"	low-medium	low-medium 6"-18"	low-medium	low 6"-12"
COVER CROP	**Sheep Fescue**	**Hard Fescue***	**Orchard Grass***	**California Brome***	**Blue Wildrye***	**Meadow Barley***
SCIENTIFIC NAME	*Festuca ovina*	*Festuca ovina var. duriuscula*	*Dactylis glomerata*	*Bromus carinatus*	*Elymus glaucus*	*Hordeum brachyantherum*
SUGGESTED CULTIVARS	Covar; MX86	Durar	Potomac; Palestine; Paiute	California Brome	Berkeley	Meadow Barley
SEEDING RATE (pounds/acre)	15-25	15-25	15-25	10-20	10-15	20-30
POTENTIAL NITROGEN (pounds production/acre)	0	0	0	0	0	0
TOLERANT TO TRAFFIC ?	yes	yes	yes	yes	yes	yes
WEED COMPETITION	fair to good	fair to good	good to very good	good to very good	good to very good	fair to good
REQUIRES SPRING MOWING ?	no	no	no	no	no	no
FERTILITY REQUIREMENTS	N	N	N	N	N	N
CANOPY HEIGHT	very low 3"-6"	very low 3-6"	low-medium	high 12"-30"	medium-high	medium-high

recommended for vigorous sites only

Drills are also better for putting the covercrop precisely down the row middles, and avoid seeding areas where covers aren't wanted or needed. Broadcast seeders work well for grasses and crops with strong seedling vigor. It is important to pull a ring roller behind broadcast seeders to press the seed into contact with the soil.

6. *Follow-up care:* Subterranean, rose, burr, and berseem clover all respond favorably to early season (March) mowing to suppress competing annual weeds. These covers originally evolved as pasture species. Mowing encourages tillering, spreading, and flowering, as originally, many responded to grazing by increasing the number of shoots from the crown to quickly regrow and crowd out competition. The first mowing needs to be high (six to nine inches depending on clovers) in order not to disturb desired plants or thatch.

Perennial grasses and legumes absolutely need to be mowed to remove competing annual winter weeds to prevent shading.

Larger statured plants that produce copious biomass should not be mowed, nor should they be driven over during pruning and early season spraying. Examples would include mustards, small grains, fava beans, and vetch.

Cover crops are another tool to help you manage your vineyard. Experiment to find the ones best suited to your farming practices. They require care and management. ■

New UC E-mail forum helps communications on complex Ag pesticide law

by Suzanne Clark

An electronic bulletin board opened in May 1994 to quicken and broaden the flow of information about a complex Environmental Protection Agency (EPA) regulation that covers some four million agricultural workers including those who work in vineyards, nurseries, and greenhouses.

Anyone who is concerned with the Worker Protection Standard (WPS) for Agricultural Pesticides and who has access to Internet, Bitnet, or a compatible electronic mail system is welcome to become a participant. The "WPS-Forum" bulletin board will be maintained as a free public service by the College of Natural Resources of the University of California at Berkeley.

"The forum will help people dealing with the WPS to pool knowledge, identify problems, share solutions, and distribute timely announcements — in short, to get on and stay on the same page," says Howard Rosenberg, Cooperative Extension Specialist who helped develop the WPS-Forum.

"Although the WPS was published in August 1992," explains Rosenberg, "after years of consultation with representatives of groups affected, awareness and understanding of the WPS remains very uneven. Partly because of widespread confusion about the regulation and how to comply with it, Congress enacted a bill in March 1994 pushing back the effective date of several provisions from April 15, 1994, to January 1, 1995.

"Many agricultural employers, employees, and advisors still have basic questions about the WPS, and all face difficulty in keeping abreast of rule interpretations, proposed modifications, and practical tools and references for compliance."

Kathy Taylor, US EPA Branch Chief for Pesticides and Toxics in Region Nine, notes: "This is a great idea. EPA is very interested in pursuing electronic communication. For example, the agency is reviewing certain parts

Continued on page 62

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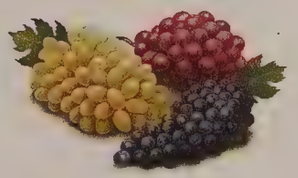

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SYRAH IN THE UNITED STATES AND AUSTRALIA

Que Syrah, Shiraz
. . . whatever will be, will be

by Eleanor & Ray Heald

"There's been a dispute about the true origins of Syrah," John Gay of Rosemount Estate (Australia) suggests. "I believe we know that it's not Persian," responds winemaker John Buechsenstein, formerly with McDowell Winery (Hopland, CA). "It was a nice story for a while, however."

Craig Williams, winemaker at Joseph Phelps Vineyards (St. Helena, CA), has had discussions with Rhone producers (Michel Chapoutier, Marcel Guigal, and Girard Jaboulet) and ampelographer Pierre Galet, who has been to Persia. He also concludes that attributing origins to Persia is incorrect. Suggesting origins in Yugoslavia, may also be curious and interesting, but without adequate ampelographic foundation.

With these opening comments, ***PWV***'s varietal review of Syrah in the United States and Australian Shiraz began. From origins and soil geology to vine vigor, cellar techniques, and overall potential, ***PWV***'s panel discusses cutting-edge issues related to Syrah and in some cases ***PWV*** learned whatever will be, will be!

Other proprietors and/or winemakers included in the discussion from California are: Paul Brasset, Christopher Creek Winery, Healdsburg; Matt Cline, Cline Cellars, Sonoma; Doug Danielak, Jade Mountain, Angwin; Steve Edmunds, Edmunds St. John, Emeryville,; Michael Havens, Havens Wine Cellars, Napa; Bob Lindquist, Qupé, Los Olivos; John MacCready, Sierra Vista, Placerville; Chuck Ortman, Meridian Vineyards, Paso Robles; Lou Preston and Kevin Hamel of Preston Vineyards, Healdsburg; Mick Schroeter, former Penfolds winemaker, Australia, and a winemaker presently at Geyser Peak, Geyserville; from Washington: David Lake, Columbia Winery, Woodinville; from Australia: John Duval, Penfolds Wines, Nurioopta, South Australia; Trevor Mast, Mount Langi Ghiran (pronounced Langee Jeeran) Vineyards, Ararat, southwest Victoria; Philip Shaw, Rosemount Estate, Denman, NSW, Australia; Viv Thomson and Simon Clayfield, Best's Wines Pty Ltd., Great Western, Victoria.

Soil and climate

"Soil probably wins out over climate as the major factor for producing the best fruit," comments Schroeter. "In Australia, Shiraz grows in many different locations from hot, dry, heavily irrigated locations to marginal, cool climates at high altitudes.

"Climate will therefore influence style, but soil is the key factor in growing Shiraz. In Australia, soils can be generally categorized as poorer than in California."

Australia is a continent where soils are geologically old. "We tend to neglect this fact when talking about grapegrowing in Australia," John Gay notes. "Soils are ancient, nutrient-deficient and not very fertile, except in specific irrigated regions."

Edmunds describes soils from which he sources grapes. "We purchase from many winegrowers and there are a significant number of different soil types involved," he states. "From a vineyard in El Dorado County, the soil is decomposed granite, while in one vineyard in Sonoma County, there are three distinct soil profiles, which include cobbly clay, cobbly loam, and some red, rocky soils with very little clay."

MacCready explains that Syrah at Sierra Vista is grown on two soil types: one volcanic in origin and the other is decomposed granite. He maintains that Syrah from both places is very fruity and has soft to medium tannin levels. Grown on its own roots, the volcanic vineyard produces a higher level of aromas than the granitic vineyard which is grafted onto Sauvignon Blanc roots.

At Sierra Vista, a new vineyard is being planted on its own roots in granitic soil. "It will be years before a determination of the quality of the two vineyards on their own roots, in the different soil types, can be made," MacCready says. "Because of the many microclimates in El Dorado County, it is difficult to make a categorical statement about Syrah.

Preston discusses growing Syrah grapes in Dry Creek Valley. "We have the same Syrah clone grown on the same rootstock planted within a hundred yards of each other on quite different soils," he remarks. "One soil is light riverwash that doesn't hold moisture well and requires drip irrigation. The other block is gravelly clay that holds more moisture and much of it is grown without irrigation. The resulting wines are quite different in both aroma and apparent fruit ripeness. There's a kinship across the qualitative aromatics, but the degree of intensity is different in the fruit produced on the richer soil."

Kevin Hamel extends the contrast by commenting about a smoky, meaty/bacon-like character in wine produced from the gravelly, more vigorous site. "On the palate, the wine from the riverwash soil is overall more delicate, less full in structure," he explains. "Tannins seem to be a little more attenuated and the wine is more elegant."

Training/trellising

Trellis and training systems for Syrah vary more widely than wine style in Aus-

tralia or west coast U.S. vineyards.

Vigor is not as great a problem in Australia as it is in California. To control vigor at Geyser Peak, Syrah is grown on a Geneva Double Curtain (GDC) to spread out the canopy for better exposure of fruit to sunlight. Qupé utilizes some GDC. Experiments are ongoing with both vertical trellis and a quadrilateral cordon in Edmunds St. John's vineyard sources.

"In Australia, some of the richer soil areas will use a split canopy, but generally, it's grown on two-wire trellis because the sites are low vigor," Schroeter comments. "Vines are on a bilateral cordon, machine-pruned, and machine-harvested. Vertical training is the method at Australia's Best's Wines, but it's also practiced at Jade Mountain's Cloverdale, CA, vineyard.

A bilateral cordon is used at Red Willow Vineyard for Columbia Winery in Washington State and also by some vineyards picked for Edmunds St. John.

Single stake head-trained (Goblet) vines are the norm at McDowell Winery and Meridian Vineyards. Much of the vines in McLaren Vale producing grapes for Australia's Rosemount Estate Show Reserve Syrah are self-supporting, "bush vines" close to the ground, with no wires or stakes. The balance of Syrah vines have a single cordon at about 18 inches above ground.

A double arch cane is the chosen training at Mount Langi Ghiran, Australia, while a single wire at one meter is employed by Penfolds.

Bilateral cordon can be found at Joseph Phelps Vineyards, Preston Vineyards, and Sierra Vista. "We started out with bilateral cordon," MacCready comments. "When the vines were eight years on the cordons, they began to push unwanted fruitful canes and thus started to increase the yield upwards toward eight to ten tons/acre. We had to thin heavily to ripen the fruit. By changing to cane pruning and thinning, we hope to control the fruit set. Vigor is being controlled by hedging and leaf removal. Our newest Syrah planted 4x12 (908 vines/acre) is being cane-pruned to the kniffen training system and a vertical trellis with movable wires is installed." New vineyard development at Joseph Phelps is a high density, vertical system spaced 5x9.

In the newest vineyard (third leaf in 1993) at Cline Cellars in the Carneros district, planting is 5x10, 860 vines/acre, and there is a vertical trellis system. "We're leaning toward cordon," Cline says.

Yields

Hamel explains that the poorer soil in Preston Vineyards is more self-regulating in vigor and yield, while the more vigorous site, if allowed, would produced 4.5 tons/acre. "We strive to keep it between 3.5 to four tons/acre," he contends.

Paul Brasset explains that, at Christopher Creek, they have heavier soils. "If we let the vines go, they would easily produce seven to eight tons/acre," he claims. "With viticultural practices, we try to control it to four to five tons/acre.

All participants agreed that keeping yields under five tons/acre is the goal. "But," counters Buechsenstein, "when someone questions yield, they must also ask for planting density. Just by tradition, most California producers have a less dense plantation, somewhere between 400 and 600 vines/acre, but in the Rhone it can be three times that. Therefore, each vine is bearing less crop to achieve the same yield/acre."

When asked about Australian Shiraz yields, Schroeter responded that it is highly variable. "In the Barossa Valley, yields are typically low because of wide row and aisle spacings. In Coonawarra, there's closer spacing, but not as close as the close spacing practiced in France's Rhone Valley or with newer plantings in California. Coonawarra yields average five tons/acre. Fruit used for the Penfold's Grange Hermitage is typically around 1.5 tons/acre."

Gay agrees, "Australia's a big country and you can find just about any yield averages you're looking for. Naturally, with 100-year-old head-pruned vines, yields are low, about ¾ ton/acre, as exemplified by the Rosemount McLaren Vale Shiraz."

Disease pressures

In France, the most significant problem is eutypa. "We do have eutypa in our vineyards," says Hamel, "but not with Syrah."

"On the west coast of the United States, Syrah is not significantly virus-susceptible," Buechsenstein comments. "There is an old (70+ years) block right next to badly virused (fan leaf and red leaf) Petite Syrah in the McDowell Valley Vineyard. The potential for virus transmission, especially at pruning has been significant, yet the Syrah shows no virus signs."

Preston has two different clones of Syrah planted. One clone, which was obtained from Joseph Phelps Vineyards is on St. George rootstock and is the older planting. It is quite delicate with low vigor and it does have virus infection in the red leaf family. "We wait a lot longer for grapes from these vines to ripen," he comments.

Picking parameters

"Picking decisions must be based on vineyard location and the style of Syrah that's the intended outcome," MacCready stresses. "I believe that in California, some producers are making a varietally labeled Syrah from grapes that probably should have been used for blending. Syrah growing on a northern slope will be entirely different from that grown on a western slope."

Danielak refers back to yields in pursuing this concept. "At Jade Mountain, we have Syrah yielding seven, five, and two tons/acre," he points out. "The higher yield fruit is very useful for blending while the lower tonnages stand out as singular wines."

Flavors are considered the most important picking parameter. "We tend to pick on flavor," says Hamel. "But we always know what the sugar, TA, and pH are. With Syrah, it's a matter of perceiving the ripe, plummy, smoky flavors in the fruit itself. The Preston block in gravelly soil develops these flavors at relatively low sugar levels in the range of 22.5° to 23.5° Brix. On the more vigorous soils, we don't detect the requisite varietal flavors until 24° Brix."

Intense, rich, and plummy is the way Philip Shaw describes Rosemount Estate Syrah grapes.

MacCready maintains, "It is possible to get good varietal flavors in the fruit at lower Brix levels. But you don't get the richness and depth of character in the wine."

"There's significant variation between vintages," Edmunds suggests. "Syrah that we get from Placerville (in El Dorado County) ripens very slowly. In a couple of years, we've picked that fruit between 21° and 22° Brix and it had tremendous flavor. It made a gorgeous wine with flavor persistence and complexity, but it didn't have the richness as John MacCready suggests, but I believe richness is partly a function of alcohol levels. So, I'm in the flavor camp with Kevin Hamel. In some years that means, we'll pick at high sugars and in other years we won't."

At Qupé, winemaker Bob Lindquist comments about his Bien Nacido grape source, a cool Region I vineyard. "Syrah is planted next to Pinot Noir, but it ripens about six weeks later than Pinot," he says.

"It rarely rains in September and October during harvest in Santa Barbara County, so Syrah can hang until finally ripe."

Whole berries/whole clusters

"With red wines, we typically destem and crush everything," Hamel comments. "With Syrah, we've done some trials with partially uncrushed fruit — whole clusters and berries. The fermenter is partially filled with whole clusters. There's a dramatic difference in the taste of the wine.

"If we typically have smoky, earthy, plummy flavors and 30% whole clusters are included, the nose has elevated raspberry fruit."

Schroeter explains that at Penfolds in Australia, machine-harvested fruit always goes through the crusher and is destemmed. At Rosemount Estate, a portion sees carbonic maceration that goes into a Shiraz-Cabernet blend. "The traditional Shiraz is fermented in open-top fermenters with regular cap submersion for part of the wine, and American oak fermenting (partial) and additional barrel ageing," says Gay.

Williams has explored utilizing whole clusters at Phelps. "It continues to evolve, but we are using less whole clusters," he comments. "But it is certainly part of our program. From 1974 through 1981, we made Syrah the same way we produced Cabernet Sauvignon and to be quite honest, it was a bitter, tannic wine.

"Over the years, to make a more approachable, softer, less tannic yet flavorful wine, we looked at co-fermentation with Grenache and since we didn't have Viognier at the time, we selected Chenin Blanc for co-fermentation. I can't say that was totally successful, but it led us to consider whole berry fermentation. It did make the wine more enjoyable.

"Now we're refining that concept including light crushing, some stem inclusion, and punch-down rather than pump-over for cap management. I think we've incorporated traditional as well as technical reasons to ferment Syrah differently from Cabernet Sauvignon. If anything, Syrah, should be considered more like Pinot Noir than any other red variety. However, I have tasted several Syrahs that are made in a traditional way, following the Cabernet Sauvignon model and they are delicious. It all goes back to a winemaker's understanding of *terroir* and a specific fruit source.

"To throw some tyranny into this discussion, I'd like to say that while there are similar threads in what we're saying, the difference lies in *terroir*. There's no getting around this."

Chuck Ortman sides with this train of thought. "We believe in growing the best grapes possible and then guiding them to perfection with little or no manipulation," he adds. "We've tried whole clusters and did not like the results with our fruit."

Cap management

"In general, I'd say that cap management techniques do make a difference in the wine that's eventually bottled," maintains Cline. "Each winemaker must understand the fruit. Gentle punch-down may not make a difference in five tons/acre fruit, but from a ¾-ton/acre vineyard that's also a stressed site, tannins might be bitter. A standard management can't be employed for both of these fruit sources."

Managing tannins

"If winemakers want certain elements extracted from a grape, they have to decide how to obtain them," Havens maintains. "If you want more tannin, let the peak fermentation temperature go high when there's been greater alcohol conversion. If you don't want tannin, but want fruit extraction, then you have to do this when the alcohol level is not so high.

"In that sense, our earlier comparison with Pinot Noir is a good one. Texture is important in Syrah, just as it is with Pinot. I prefer, therefore, to get extraction early. I am experimenting with a cold soak. It seems to have some merit."

Among panel participants, one of the biggest acknowledged challenges of Syrah production is trying to extract color and what Williams refers to as 'sweet tannins' or soft tannins from the fruit, while at the same time minimizing harsh tannins which are inherent in the varietal.

"The vineyard holds the ultimate trump card in the discussion of tannins," Williams contends. "Tannins are site-specific and knowing them dictates cellar practices. It's unfair to take the practices of Cote Rotie and directly apply them to California or anywhere else in the world Syrah is produced. Rigid templates are not useful."

Wine style

"I believe that trying to create a "style" is a fool's errand," Edmunds maintains. "The fruit with which the winemaker works has plenty to say. The winemaker's job is to find out what the fruit has to offer and put it in the bottle, carefully and faithfully."

"The vineyard and region dictate wine style," maintains Thompson. "In recent years, the use of some new oak and less oxidative handling has produced Shiraz wines which are drinkable earlier. But with reasonable storage, Great Western, Victoria Shiraz will continue to develop in the bottle for a minimum of ten years and up to 30 for the best vintages."

David Lake, whose production comes from the first Syrah vineyard in the Pacific Northwest, contends that he is still exploring the vineyard to produce a regional style. "Generally, the emerging style is similar to a northern Rhone wine, specifically Hermitage," he comments. "Fruit quality from the L'Espiguette clone is berry-like with distinctive smoky, bacon notes. Wines are full-bodied with intense flavors and ripe tannins."

"At Phelps," Williams adds, "our goals remain in transition as we see improvement in wine quality due to both vineyard and winemaking adjustments. "Over the years, we've evolved from a light-style Syrah produced in the early 1980s to a style that's more generous in color, aroma, and flavor. In the 1990s, we continue to evolve and make adjustments to three distinct regions where fruit is sourced — Carneros, Stags Leap District, and St. Helena."

Regional identification

"Syrah is beautifully adapted to the southeastern Mendocino, McDowell Valley," states Buechsenstein. "It expresses fruit character similar to Syrah from Cornas, the most southerly of the septentrionale Rhone Valley. Flavors are rich plum and cassis with hints of tar, leather, and violets. Fruit flavors ripen easily just about every year."

Ortman discussed regional flavors, "Paso Robles lends itself to rich flavors of blueberries, raspberries, coffee, chocolate and cedar. This region produces soft but ample tannins to carry the wine, though drinkable early, through many years of ageing."

Edmunds is not as confident that regional identities have been identified yet. "I buy Syrah grapes from Durell Vineyard, part of which is in the Carneros district," he explains. "Soils are different in each block. I buy 30% of the Durell fruit, Kendall-Jackson (K-J) buys the rest. The wines I make and the K-J wines are so different, I defy anyone tasting them blind to

even suggest they're from the same grape, let alone from the same region. I don't know what the unique characteristics of Syrah in that region are. Maybe in 20 or 30 years, we'll know more."

"Perhaps its our fruit source," says Mast. "In our vineyards, situated on the southern edge of the Great Dividing Range in South West Victoria, 180km west of Melbourne, we have old Shiraz vines that were imported into Australia in 1860. The fruit is always spicy with black pepper." Currently, at Mount Langi Ghiran, 10 clonal trials are being conducted in a soil type which is principally ironstone quartz over friable loam clay which is mineral-rich with good drainage.

"Shiraz has been grown in South Australian premium areas for many years," maintains Penfold's Duval. "The Barossa Valley is fortunate to have quantities of old vine Shiraz which is important to the production of the rich berry fruit character required for Grange Hermitage."

Potential

"Syrah has the potential to become California's greatest red wine," predicts Danielak. "At lower crop levels, Syrah shows ample structure and tannin. Clearly, the most ageworthy Rhone grape, it develops graciously and evenly for 20 years or more.

"In California, the goal should be to produce Syrah on low vigor sites which offer ample, soft tannins and maintain high acidity for complex, long-lived wines. At higher crop levels, Syrah tends toward lower acidity and minimal tannins. In these wines, the higher pH lends increased mouthfeel and softness making them ideal for blending with Grenache and Mourvedre or even Cabernet Sauvignon."

What about the consumer's understanding of the multiplicity of Syrah styles? "If the wine is well-made and tastes good, the style will be appreciated," Williams responds.

"The rule for California, which may carry on for some time, is that the differences among Syrah bottlings should be appreciated," Buechsenstein adds.

"The single element I worry most about," notes Edmunds, "is that in spite of the fact that we see differences among the best Syrah-producing regions of the world, we don't end up making blanket statements about California. Decisions about how to handle a wine must start with the individual fruit. I get such different Syrah grapes from Durell than from Placerville or any of my other sources. They are completely different animals.

"There may be places in California that are suitable to produce Syrah in a Beaujolais style, and by the same token, there may be sites capable of producing something more like Cote Rotie."

In speaking about Australia, Schroeter agrees with the remarks and uses the Penfold's Barossa Valley production facility as an example. "There, we handle fruit from many different soils and climatic influences," he says. "There's no set production technique and there should not be." ■

PWV *thanks Lou Preston, owner of Preston Vineyards in Healdsburg, CA, for hosting the tasting and discussion.*

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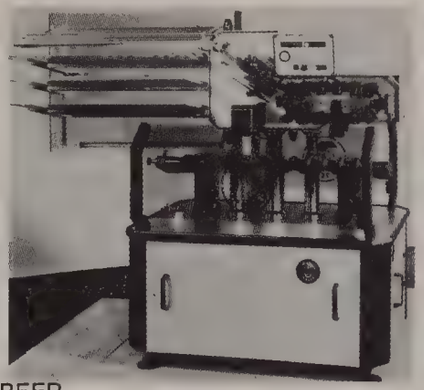
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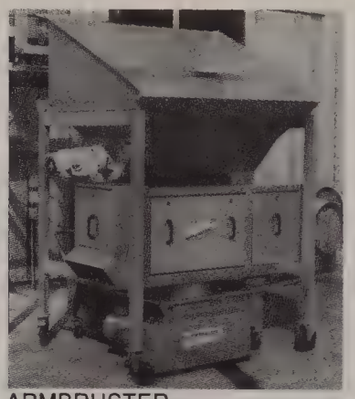
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Nutrient requirements of wine yeast

by Paul Monk, Lallemand, Australia P/L

Introduction

The membrane of a yeast cell separates the cytoplasm and enclosed organelles from the fermentation medium, and by selective transport in and out of the cell, maintains an environment suitable for metabolism and growth.

The ability of a yeast culture to grow in grape must and complete fermentation depends upon:

- condition of the cell membrane;
- quantity and proportion of the yeast reserve materials glycogen and trehalose;
- availability, concentration, and relative proportions of nutrients;
- the viable cell density at inoculation;
- and fermentation temperature.

Several conditions of fermentation can be manipulated to contribute to production of a quality wine.

The condition of the cell membrane can be optimized by aerobic preparation of a starter culture, or by use of active-dried yeast. In grape must, availability of nitrogen as amino acids can be a growth-limiting factor and can be supplemented where necessary with inorganic nitrogen as diammonium phosphate and/or inactive yeast preparations rich in amino acids and peptides. Low growth rate or low cell yield resulting from vitamin deficiencies can lead to slow or incomplete fermentations. Sometimes these problems can be avoided by adding a vitamin supplement at the time of inoculation. The supplement, when required, can include biotin, pantothenic acid, inositol, pyridoxine, and thiamine.

Since it is difficult to predict when there is a nutrient deficiency beforehand, many winemakers now routinely add supplements to all fermentations, often using the initial concentration of ammonium ion or free ammonia nitrogen (FAN) as indicators of how much to add.

The ability of a yeast strain to grow at low temperatures (<15°C) is yeast-strain-dependent and for a given strain, might require a period of adaptation. The improved character of wine from fermentations at lower than 15°C is questionable, however temperature is a very effective way of controlling the rate of fermentation. Lower temperatures will cause decreased growth and less demand for nutrients to produce cell biomass.

Yeast growth

With regard to O_2 requirements, yeasts are facultative micro organisms. That is, they are able to grow both aerobically and anaerobically. They obtain energy from the catabolism of fermentable sugars. The available energy is coupled to the anabolic process of the cell, fabricating essential cell components from intermediates of carbohydrate and nitrogen metabolism and other nutrients provided in the growth medium.

Strains of wine yeast, while growing in grape must, have two main functions in the production of wine: to convert sugars to alcohol (CO_2 and heat) and contribute desirable sensory compounds to wine under essentially anaerobic conditions. Some yeast strains are now being developed specifically for their ability to produce enzymes which enhance the aroma and flavor inherent in juice and assist in the extraction of flavor from grapes such as VL-1, a strain known to contain terpene glucosidases.

To grow successfully in grape must, the yeast culture must be provided with many essential nutrients. The availability and concentration of nutrients in grape must is related to grape variety, rootstock, soil and climate, viticultural practices (including irrigation and fertilization), and must processing. The composition is complex and there are no rapid methods of analysis which can give a complete indication of the ability of the must to support yeast growth, although some winemakers try to use the concentration of NH_4 and/or FAN as a general N-status indicator with mixed results.

The nutrients required for yeast growth can be broadly grouped as carbohydrates, nitrogen (both organic and inorganic), vitamins, minerals, and molecular oxygen.

Carbohydrates

The sugars in grape must that are available for yeast growth are glucose and fructose in approximately equal proportions. Other higher molecular weight sugars are not fermented by wine yeast, but can be used by strains of *Leuconostoc oenos*. The total fermentable sugar content of grape must varies over a wide range but usual concentrations are between 200 and 300 g/L. Sugar concentrations above about 150 g/L will start to inhibit yeast growth, due to high osmotic pressures, although different strains seem to vary in their osmotolerance. High sugar concentrations will also stimulate the accumulation of acetic acid in the wine.

The metabolism of sugars in grape must occurs by fermentation (rather than respiration) even in the presence of oxygen. Glucose, in excess of about 2 g/L, inhibits respiration by a process called catabolic repression, also known as the "Crabtree Effect." It is by fermentation that the end-products ethanol and CO_2 are produced.

The accumulation of the polysaccharides trehalose and glycogen in the yeast cell during growth is an important result of carbohydrate metabolism. These compounds increase in the cell as yeast growth slows and continue to be stored, after the cell has stopped budding, increasing cell biomass. Nutrient limitation in grape must, particularly limitation of available nitrogen, will stimulate accumulation of trehalose and glycogen in the yeast cell.

These compounds act as reserve materials, being metabolized in the resting cell to provide both energy and carbon for maintenance and to retain viability during storage. This is a very important factor when growing yeast to prepare active-dried cultures.

When yeast is added to grape must to initiate fermentation, the yeast biomass decreases during the lag phase. This loss is attributed to glycogen metabolism, which is accompanied by an increase in sterol content and removal of dissolved oxygen from grape must. Slow and incomplete grape must fermentations have been attributed to inadequate concentrations of cell glycogen caused by suboptimal previous growth or storage conditions.

Not all the sugar fermented by yeast appears as alcohol. A small amount provides

the carbon in the cell biomass and fermentation by-products including glycerol.

Nitrogen

The type and concentration of available nitrogen in grape must determines the rate of fermentation, the extent of yeast growth, and the sensory properties of the finished wine. The metabolism of nitrogen compounds by a particular yeast strain is of major importance in all alcoholic fermentations. Nitrogen is available for yeast growth in grape must as inorganic nitrogen, amino acids, and peptides. The concentration of amino nitrogen in grape must is related to variety, vintage, viticultural practices, climate, and fertilization of the vineyard. The proportion of individual amino acids varies widely, with little relationship between composition and yeast growth being seen, although total concentration, FAN, and sometimes ammonium concentration can be an indicator of the ability to support yeast growth.

The fate of amino acids taken up by the yeast cell is complex. Very little, if any, of an amino acid in grape must is incorporated intact into cellular protein. Instead, it undergoes a transamination reaction leading to products of glutamic acid and a corresponding oxoacid. The oxoacids formed by yeast act as substrates for the biosynthesis of aldehydes and fusel alcohols, compounds which significantly influence the sensory properties of wine. The formation of esters is related to amino acid metabolism, providing alcohols to react with fatty acids made available during the synthesis of saturated and unsaturated fats and phospholipids.

The concentration of alpha-amino nitrogen or ammonium salt is directly related to the fermentation time for grape must; that is, the higher the concentration of available nitrogen, the faster the fermentation. Amino acids and ammonium ions are taken up by active transport systems involving many different permeases (carriers); however, concentrations higher than those required to supply nitrogen for growth will stimulate the yeast growth rate.

The nitrogen supply, either from the grape, the addition of ammonium salt or yeast extracts, can influence yeast growth, fermentation time, and the sensory properties of a wine. Different yeast strains under similar conditions have different growth rates, nutrient requirements, and abilities to produce and excrete esters and fusel alcohols. The interaction between yeast strain and grape must composition can influence wine quality and style.

Minerals

On a dry weight basis, yeast contains an average of 2.6% phosphate as phosphorus pentoxide, 2.5% potassium as potassium oxide (K_2O), 0.4% magnesium as magnesium oxide (MgO), 0.5% sulfur, and trace amounts of calcium, chlorine, copper, iron, zinc, and manganese. The relative proportions of these compounds in yeast indicates their importance to yeast metabolism.

Yeasts are unable to grow unless provided with a source of phosphate. This anion is involved in energy conservation and transfer, and is part of many organic compounds in the yeast cell. Yeasts actively transport phosphate as the monovalent anion $H_2PO_4^-$. The transport and incorporation is very rapid and the concen-

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Inorganic phosphate is stored as metaphosphate in the cell, part of which can be converted to orthophosphate when required. The presence of stored metaphosphate is considered necessary for rapid yeast growth, providing a source of phosphate and acting as a reserve of chemical energy to drive metabolic reactions. Phosphate naturally present in must is usually adequate for growth; however, limited growth stimulation can occur by increasing the phosphate concentration.

Potassium is required for yeast growth and fermentation, although it is not incorporated in the structural or organic components of the cell. Potassium ions are taken up by active transport, which requires energy. As yeast assimilates glucose, potassium ions are taken up simultaneously and are accompanied by the transfer of a hydrogen ion. The permease or carrier that transports the K^+ into the cell also transports NH_4^+, but with a much lower affinity.

Potassium is necessary for the uptake of phosphate. Phosphate uptake leads to acidification of the cell, which then retards phosphate transport. The simultaneous uptake of the K^+ ion increases the buffer capacity of the cell, allowing accumulation of higher phosphate concentrations. Grape must contains adequate amounts of K^+ ion for the operation of transport systems and active yeast growth.

Magnesium is required for yeast growth as it acts as an enzyme activator, particularly for phosphate transferases and decarboxylases. An example is pyruvate decarboxylase, which yields acetaldehyde. Magnesium is actively transported into the cell, with a corresponding secretion of two K^+ ions. K^+ ions at low concentrations stimulate uptake of the Mg^+ ion, but at high concentrations limit its uptake.

Yeast requires sulfur for the synthesis of methionine and cysteine, which are incorporated into protein, glutathione, coenzyme A, and thiamine. Biotin also contains sulfur, but wine yeast are unable to synthesize this vitamin.

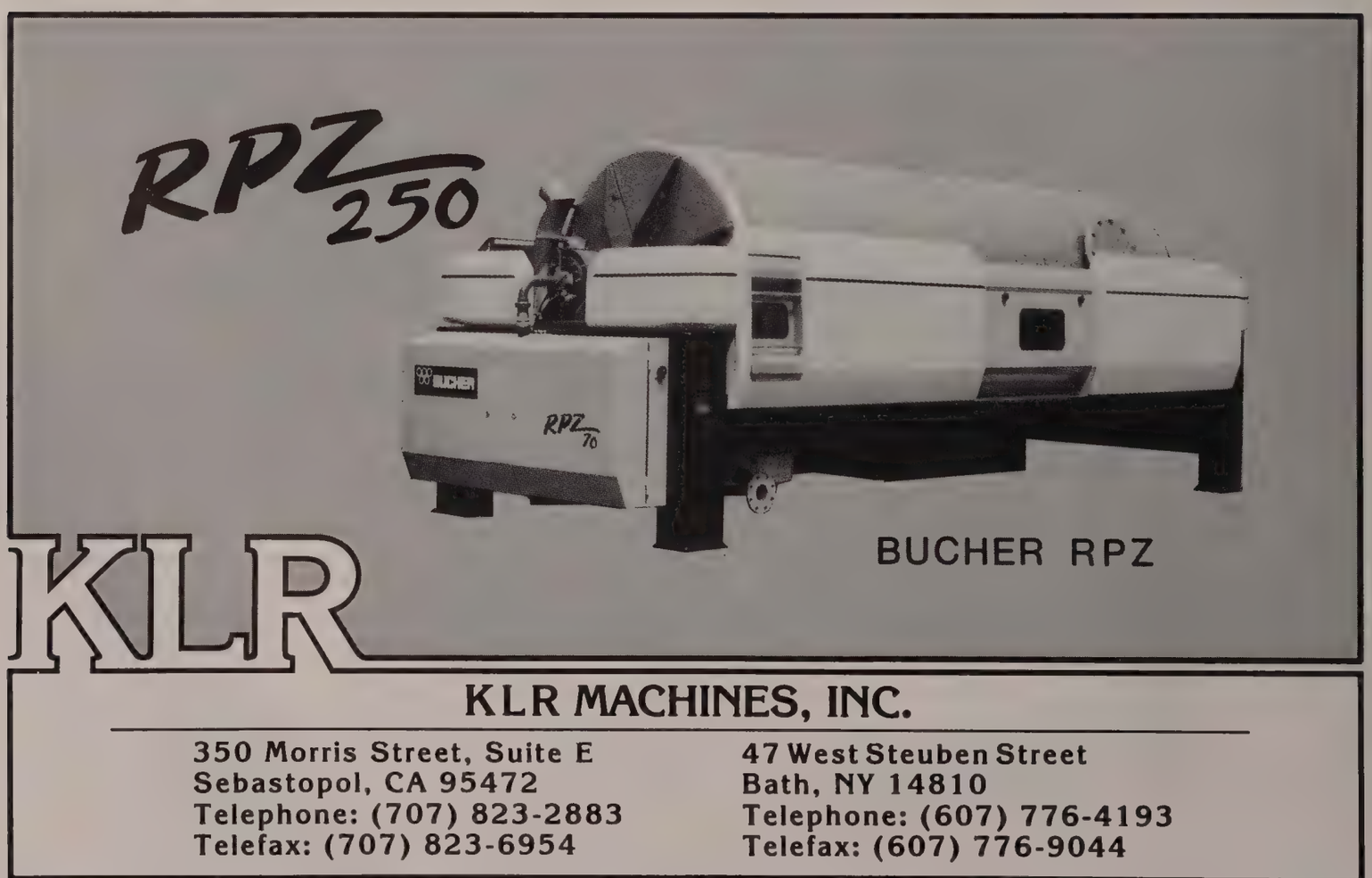
In grape must, sulfur is available to yeast as inorganic sulfate, methionine, and in soluble proteins and peptides. Sulfate is metabolized by yeast, first being converted to sulfite and then sulfide before being used in the formation of the end products methionine and cysteine. The hydrogen sulfide formed from metabolism of sulfate can be excreted into wine if the yeast becomes starved for nitrogen due to either low concentration in the medium or impaired ability to transport available nitrogen into the cell.

The elements zinc, copper, and manganese are required in trace amounts and promote the rate of fermentation. In high concentrations, they are toxic and, while addition of zinc to grape must can be beneficial, manganese must be present to avoid autolysis and inhibition of growth.

Vitamins

Vitamins are essential cofactors of enzyme function and are required for yeast growth. Requirements for vitamins by yeast are strain-dependent and their addition to grape must can often stimulate yeast growth rate and fermentation.

Biotin — Biotin cannot be synthesized by wine yeast and has to be available in grape must. Biotin is involved in carboxy-



lation of pyruvic acid, nucleic synthesis, protein synthesis and syntheses of fatty acids, and hence plays a central role in yeast metabolism. Yeasts starved of biotin have a high death rate caused by inhibition of deoxyribonucleic acid synthesis. Damage to the cell membrane results from a deficiency in fatty acid. Biotin is required in very low concentrations, five μg/L being adequate to support yeast growth.

Pantothenic Acid — Pantothenic acid is required by many strains of fermentation yeast. It is an essential component of coenzyme A, required for carbohydrate and lipid metabolism and cell membrane function. A deficiency of pantothenate can lead to the accumulation of hydrogen sulfide and will occur when pantothenate concentrations in the medium fall below 0.15 mg/L. Stimulation of yeast growth rate and yield is dependent upon pantothenate concentration, but does not affect yield of ethanol from carbohydrate.

Thiamine — Thiamine (vitamin B_1) as thiamine diphosphate is the coenzyme in oxoacid decarboxylation. Thiamine will stimulate the yeast growth rate and hence fermentation rate of wine yeast but will not necessarily increase cell yield. A few strains are unable to synthesize thiamine. The addition of sulfur dioxide will inactivate some thiamine in grape juice. Yeast rapidly accumulate thiamine when added to a medium. Thiamine added to a medium in which *Saccharomyces cerevisiae* is growing is found to interfere with the synthesis of pyridoxine, requiring the addition of pyridoxine to the growth medium.

Nicotinic Acid — Nicotinic acid is required for the synthesis of nicotinamide adenine dinucleotide (NAD) and nicotinamide adenine dinucleotide phosphate (NADP), coenzymes that act in conjunction with dehydrogenases. Wine yeast can synthesize its requirements for nicotinic acid under aerobic conditions, but this ability is restricted in the absence of oxygen.

Inositol — Inositol is required for cell division. When combined with lipids, it contributes to cell structure. A deficiency will decrease the rate of carbohydrate metabolism. Wine yeasts vary in their ability to fulfill their own requirements for inositol and many yeasts show stimulated growth rate and yield when it is available in the medium. Grape juice usually contains adequate amounts of inositol for yeast growth.

Oxygen

Dissolved oxygen can be considered a yeast nutrient. The availability of oxygen to a yeast culture will determine initiation of fermentation and its completion. Molecular oxygen provided to a yeast culture is used to synthesize unsaturated fatty acids and sterols. These compounds are found mainly in the cell membrane and are required for activity of membrane-bound enzymes, permeability and alcohol tolerance. The compound squa-lene, formed anaerobically in the cell, is the precursor to the oxygen-requiring reactions leading to formation of lanosterol, ergosterol, and zymosterol.

Yeast growth without oxygen causes dilution of sterols in the cell membranes as a result of distribution between cells at divi-

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PART II

MAKING YOUR TASTING ROOM PROFITABLE

Debunking ten myths

by Mark Kendziorek,
Tasting Room Associates

Profit margins from wine sales in the tasting room are nearly three times those of FOB wholesale. Any winery — at least any winery trying to make a profit — should seriously examine its tasting room operation and environment. If your tasting room isn't really working for you, something needs to be changed.

When meeting with winery owners, managers, and winemakers, I have noticed several common false assumptions and beliefs which often color their view of tasting rooms and actually cost them potential sales:

- My tasting room cannot be a profit center.
- My level of sales is satisfactory.
- A tasting room is primarily for public relations.
- I must concentrate on case sales.
- Customers want only sweet wine.
- I cannot pay my staff very much.
- Additional merchandise is too much trouble.
- The customer will only spend a specific dollar amount.
- I make great wine and the customer should recognize it.
- I make too much wine to sell everything in the tasting room.

Do any of these sound familiar? How many of these fallacies stand in the way of tasting room success at your winery?

As discussed in Part I (May/June 1994 ***PWV***), a winery's tasting room can and should be a major profit center. There is no reason that serious profits cannot be made within the confines of a well-operated tasting room — profits far beyond those generated by comparable sales on the street.

Creating a profit center

What makes a tasting room a profit center? The answer is both simple and complicated, but it ultimately boils down to sales.

The more people who come into your tasting room, the greater your opportunity to make additional sales. Some wineries are located on major wine touring routes. For those lucky ones, the problem is not lack of potential customers, but one of follow-through.

The challenge is two-fold: 1) Create a retail environment that differentiates you from the competition. Produce quality wines at a fair price; offer unique and tastefully displayed merchandise; and hire friendly, helpful, and well-trained staff. Give the customer a reason to purchase something from you rather than from the competition down the road. 2) Use target advertising to attract more people to your door.

Respect the customers

Once the customers come in the door, be sure to treat them right. Whether in a restaurant, department store, grocery, or winery, respectful treatment of the customers always pays off with sales. The same thing that encourages you to order good food or buy good clothes encourages your tasters to become paying customers. Rude interaction, no matter how unintentional, is all too often the norm in most retail situations today. Yet, when a customer receives special (i.e. courteous) treatment, he or she responds positively.

The wine experience is meant to be comfortable, relaxing, and friendly. After all, that is why we drink wine. Many times, winery tasting room personnel convey attitudes of snobbishness, elitism, and arrogance. Let's face it, most Americans are not well-versed in wine terminology, very experienced in tasting, or even comfortable with the entire subject of wine. However, they are still drawn to wine touring as a major pastime and they want to learn more about wine.

It is the job of the tasting room operator to make the customer as comfortable as possible, to provide a modicum of education on a basic level, and to create an ally who will purchase today, who will recommend your tasting room to others, and who will return to buy again.

Expect higher profits

The number of times that I have heard small winery owners say that they are happy with their tasting room sales is astounding. Does this mean that they are happy with the profits that they currently earn and that they see no reason to earn more? Are the profit margins, schedule of payment, and inventory problems so enjoyable that a higher price paid in cash is not attractive? I think that the true reason for this attitude is that retail is misunderstood and even feared. Retail sales can always be improved. Setting goals is the first step.

Public relations is an important aspect of the tasting room operation, but it must remain secondary to sales. Why should you spend time and money only to have the customer purchase your wine elsewhere? By purchasing from you, customers become your allies. They receive a personal experience that becomes a unique memory.

Every customer is a potential case buyer. Consumers have to start somewhere, and buying a few bottles can be the opening act of a potentially long-running relationship. If you alienate a new buyer by communicating, overtly or subtly, that you can't be bothered with small sales, then they will go to a winery that welcomes small purchases. Small sales add up quite fast! Everyone likes to hit a homerun, but it's the base hits that win the game.

All of us started drinking wine with little or no expertise. We grew up on sweet soft drinks, and many people still drink large amounts of sweetened non-wine beverages. As the palate becomes more developed, it tends to prefer more dry and complex wines. The vast majority of neophyte tasters prefer sweet or off-dry wines. However, as they visit more and more wineries, their palates become accustomed to dryer wine. Your tasting room is a unique opportunity to

expose customers to wine(s) that they did not expect to like or even sample. Sales can be generated by the most unexpected wines, and often add up to a case.

Invest in your tasting room

Why do wineries assume that they should pay their tasting room staff significantly less than a sales representative or broker? In truth, the return on investment is far greater at the tasting room than it is through the normal distribution channels.

Today, wine tourists expect different things from a winery tasting experience than they did five or ten years ago. A successful tasting room environment must be about retail, not just about wine. A total retail ambience must be created, and this includes having unique, high-quality merchandise for sale. No one wants to turn a tasting room into a tacky trinket shop, but a tasteful and creative display of wine-related merchandise such as shirts, books, and corkscrews, for example, can add as much as 25% in additional sales. The inventory cost is low, the turnover is high, and the mark-up is usually 100%.

Retail is retail. If customers find something they like, they will buy it. The more they find to their liking, the more they will buy.

For the wine tourist, the winery tasting experience is about more than wine. It is about having a unique and fun experience. An unfriendly, arrogant, or surly staff will surely ruin the experience, no matter how fine the wine, or how beautiful the building.

Each and every wine produced by a winery should be available for tasting and sale at the winery. Not every wine should be open at all times, but, when requested, all current releases should be available to taste. If the customer doesn't taste it, your chances of selling it are minimal.

A winery's retail goal should be to increase sales to the point that the vast majority of sales and profits are generated at the retail level by the winery. That way you will have created a truly unique, memorable, and profitable retail experience for your customer. ■

Mark Kendziorek is founder/owner of Tasting Room Associates, a consulting firm established to assist wineries with all aspects of tasting room and retail operation. (Phone: 206/378-6344).

FRENCH TOAST

From StaVin comes this old French recipe for imparting oak flavors to wines.

Ingredients: *Air Dried French Oak*
Fire
Vacuum Packs

First, air dry French oak for 24 months to soften tannins. Then cut to proper length, fire toast, and vacuum pack to seal in the rich oak flavors. Insert into tanks, and add wine to taste.

StaVin modular systems are vital ingredients that enable winemakers to impart the best flavors of oak barrels. Available in modular tank systems and stainless barrel applications.

StaVin

Sole U.S. importers of the Sansaud French oak barrel.
P.O. Box 1693 • Sausalito, CA 94966 • (415) 331-7849 • Fax (415) 331-0516

- *In depth analysis of your needs*
- *High quality services*
- *References Available*

Dr. Enrique Ferro

- Enology and Viticulture Consultant since 1980.
- Responsible for award-winning wines in California, Texas, Long Island, NY.
- Travel to Europe every year in search for traditional and innovating technologies.
- From 1966 to 1976 applied traditional Northern Italian winemaking with father Stefano Ferro who graduated in Enology in 1926 at Alba
- Available for all wineries including those interested in processing Nebbiolo, Dolcetto, Barbera, Freisa, Grignolino, Sangiovese, Refosco, Cortese, etc.
- In 1984, traveled through Northern Italy with Andre Tchelistcheff.

41361 La Sierra Rd.
Temecula, CA 92592

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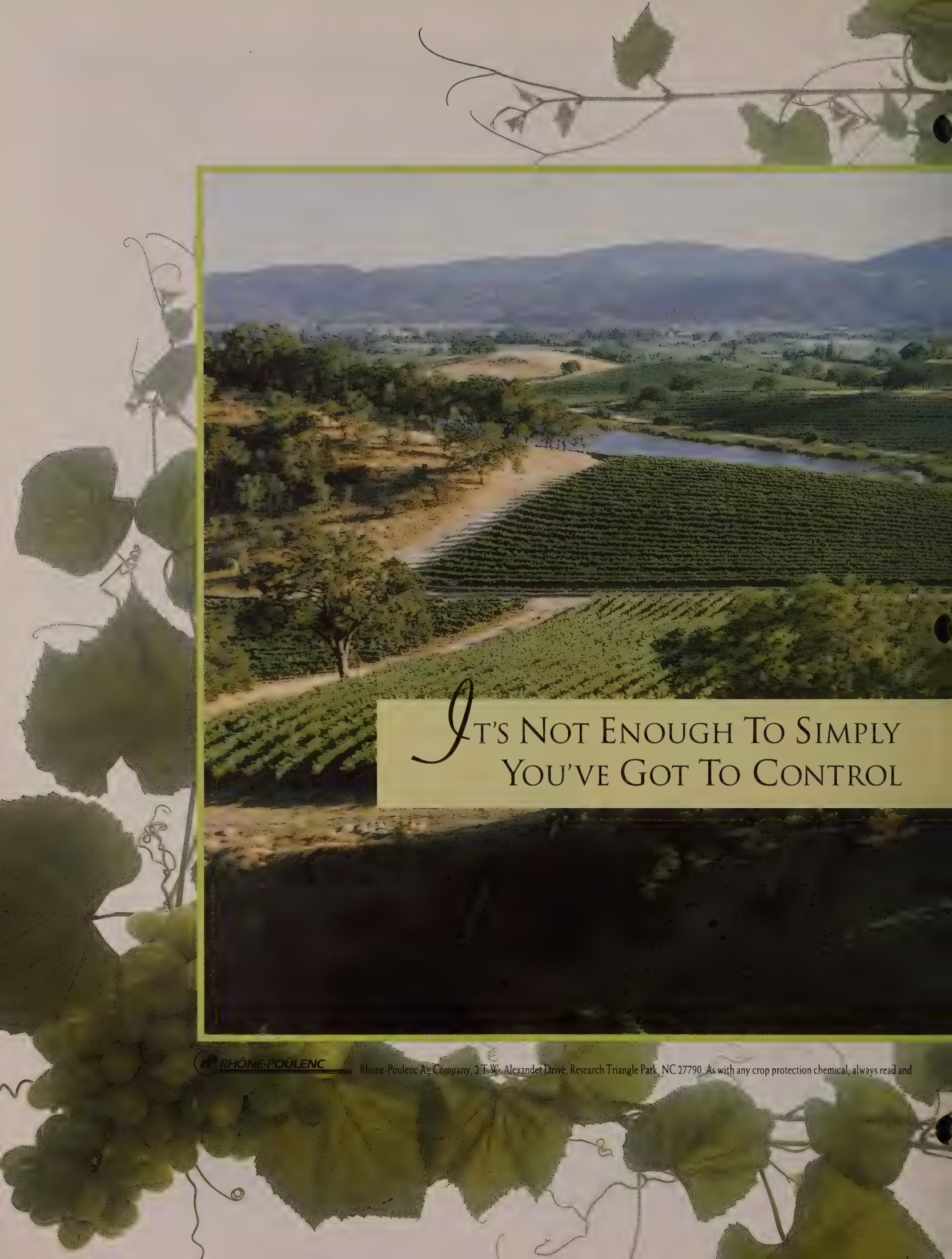
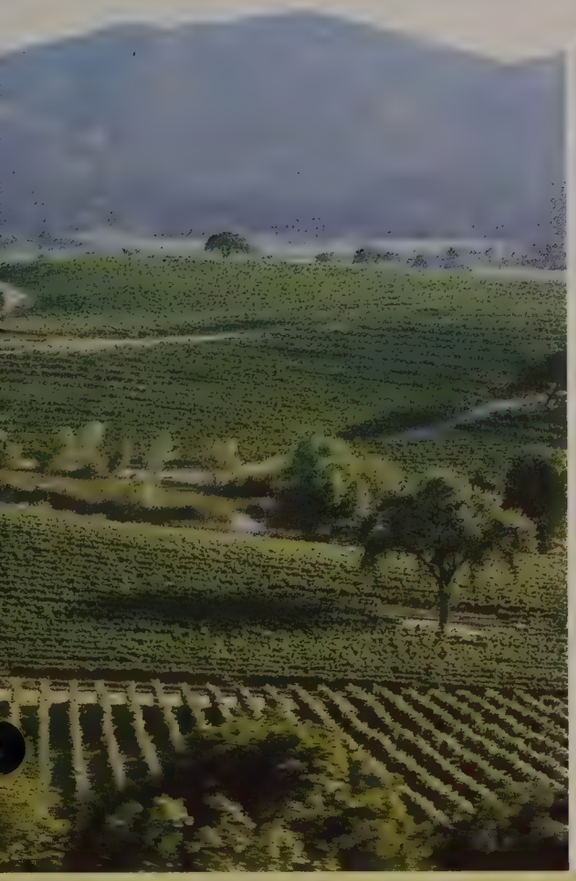


RHÔNE-POULENC

Rhone-Poulenc Ag Company, 2 T.W. Alexander Drive, Research Triangle Park, NC 27790. As with any crop protection chemical, always read and



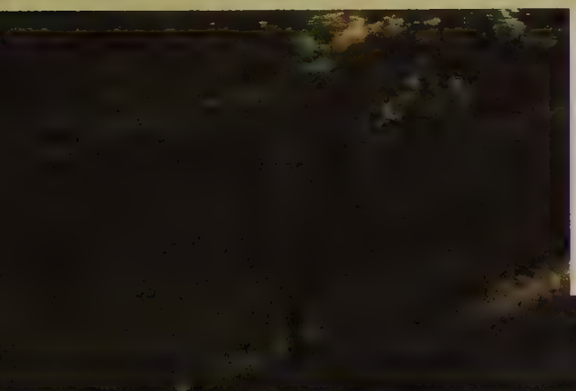
It's been said that no man is an island. Those of us in agriculture are probably more acutely aware of that fact than most. So when you consider which pesticides to use this season, consider not only what they do for you but what they don't do, as well.

Grape Leafhopper

SEVIN® brand carbaryl insecticide gives you cost-effective control of leafhoppers, omnivorous leafrollers and flea beetles. Plus, in the eastern grape growing areas, SEVIN® brand delivers excellent results on berry moths. In addition, SEVIN® also gives you favorable worker handling and re-entry characteristics as well as a seven-day PHI.

Now, what SEVIN® doesn't do is persist in the environment. Nor does it readily leach through soil to ground water. Which brings up one other advantage of SEVIN®. The confidence and pride of knowing that you're not only a responsible grape grower, you're a responsible neighbor, as well.

CONTROL PESTS LIKE LEAFHOPPERS. ENVIRONMENTAL IMPACT AS WELL.



SEVIN®
BRAND CARBARYL INSECTICIDE
THE ENVIRONMENT IS RIGHT

follow label directions. For additional production information, please call: 1-800-334-9745. SEVIN is a registered trademark of Rhone-Poulenc. ©1994 Rhone-Poulenc Ag Company

TASTE THE WINE, NOT THE CORK

The exclusive NOVA deep cleaning system creates a cork with lower polyphenols which reduces the incidence of off-flavors. Dust Free. Chlorine Free. Nova Corks.

BLIND TASTE TESTS JUDGE NOVA CORKS "PERFECT"

An independent winery tested chlorine-free NOVA corks against the competition and said, "NOVA corks are consistently... visually and sensorially the best." Wine bottled with NOVA "was chosen to have the most consistent varietal aroma and flavor characteristics (affected the least by the cork)."

Another leading winery performed extensive sensory evaluations and NOVA corks were judged "perfect"!

Nova corks produced by Portocork Internacional are available exclusively from fp Portocork.

NOVA: SCIENTIFICALLY PROVEN TO BE THE BEST

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Santa Maria De Lamas
Portugal

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601 Airpark Rd.
Napa, CA 94558
707.258.3930
FAX 707.258.3935

PACKAGING

BOTTLES • CORKS • CAPSULES • SHIPPERS

◆ Cork Associates

Cork Associates introduces the BWC-PLUS cork for fine wines. BWC-PLUS uses the proven BWC technology which washes and sanitizes the cork without use of chlorine, and the PLUS offers a more natural looking cork with neutral taste characteristics and excellent sealing abilities.

We continue to offer the popular BWC, and Natural (metabisulphite washed), and traditional corks.

Our corks are processed and screened by laboratory quality controls in our Portugal factory. Upon arrival in California, the corks are finished and go through the quality controls of our laboratory in Napa. We work to the high standards which are so important to the modern wine industry. We are a founding member of the Cork Quality Council.

In addition, Cork Associates serves the needs of the sparkling wine industry in North America with "SPARK" brand corks of the highest quality. The SPARK factory also produces Twin-Top agglomerated corks with natural disc-ends which are leading a new trend in sealing still wines. Both the Spark and Twin-Top corks have discs which have gone through the patented Enos system to remove volatile components and leave the discs very neutral in taste.

Cork Associates is always studying new methods and innovations to keep natural cork products as the preferred closure for fine wines.

For more information, contact:
Cork Associates
902-M Enterprise Way
Napa, CA 94558
tel: 707/224-6000, fax: 707/224-7616.

Please see our ad, page 11.

◆ The Wine Cap Company

Robert Mondavi Winery's sensational new bottle packages is galvanizing industry and market demand for the B-Cap Closure System. Several progressive domestic wineries, large and small, will be converting to the B-Cap closure by the end of 1994. Consumers and restaurant wait-staff love the look and easy use of the B-Cap package.

The patented B-Cap is a decorated natural wax paper laminate disk that covers and seals the top of wine corks.

Research and development for Robert Mondavi Winery's new packages began in early 1992. By the end of 1994, the winery will have converted its Woodbridge facility, completing the B-Cap transition.

Lead times will be shorter for the rest of the industry. Small wineries can convert in four months by using a semi-automatic B-Cap applicator, costing $15,000. Automatic applicators for production lines running up to 150 bpm cost about $150,000; current lead times are six to eight months for conversion. High speed applicators for up to 400 bpm can be delivered in about nine months. They cost about $400,000.

Wineries expect to recover conversion capital costs in about one year from cost-of-goods savings, price increases and/or increased market share. The savings come from B-Caps which cost from $.035 to $.05 each, depending on specifications. They can be printed in multi-colors and foil-stamped. Bottle top changes for aesthetic and/or functional reasons don't increase bottle costs.

For more information, contact:
The Wine Cap Company
2350 Taylor St.
San Francisco, CA 94133
tel: 415/928-1993.

Please see our ad, page 41.

◆ RAMONDIN, U.S.A., Inc.

Ramondin manufactures tin capsules and offers them in two ways:

A. Custom tin capsules:

Diameters from 28.75mm up to 32.00mm. Lengths from 40.00mm up to 65.00mm. Colors and decorations as per customer requirements.

B. Stock tin capsules:

Size 28.75 x 50mm: satin blue, satin red, satin green, regular gold, shiny gold, beige, black, silver, burgundy, and yellow.

Size 31.00 x 60mm: burgundy and regular gold.

These stock tin capsules are available from our Napa, CA warehouse for immediate delivery.

Ramondin also manufactures poly-laminated capsules for sparkling wines.

For more information, contact:
RAMONDIN, U.S.A., Inc.
830E Latour Ct.
Napa, CA 94558
tel: 707/944-2277, fax: 707/257-1408.

◆ KLR Machines, Inc.

KLR Machines, Inc. of Sebastopol, CA and Bath, NY is the exclusive representative in North America for Sanoplast Corp. of Switzerland, which is world-renowned for the manufacture of PVC and OPS capsules, and heat-shrink tunnels.

Sanoplast capsules have four vent holes on top for cork aeration and ease of separation. The all aluminum top disk is embossed or imprinted, if desired.

The top section is custom-made to fit specific bottle and closure. The capsules come in all standard colors in either glossy or flat finish, with or without pull tabs. Custom combinations of colors, print and graphics are available, if desired.

The Sanoplast hot-air shrink system uses less energy than most shrink tunnels. It can be easily expanded by adding modules. The tunnel is stainless steel, and motor and switch box are waterproof. No mechanical changes on the conveyor are necessary for installation.

For information on Sanoplast products, contact:
KLR Machines at either office:
350 Morris St.#E
Sebastopol, CA 95472
tel: 707/823-2883
OR 47 W.Steuben St., Bath, NY 14810
tel: 607/776-4193.
Please see our ad, page 26.

◆ California Glass Company

California Glass Company is the preeminent packaging supplier to the California wine industry with a history of more than 70 years of service to the trade.

Cal Glass offers the broadest range of packaging products available from a single source and has pioneered a number of packaging innovations from the introduction of deadleaf green glass containers to wine shippers made of foam and of post-consumer recycled material approved by United Parcel Service.

To bring customers the latest in packaging, the company has continued

to expand its product lines to include imported containers and closures; label and case-seal adhesives; oversize bottles and the equipment to cork them; polylaminate capsules to replace tin-lead; and high-end carton graphics.

California Glass Company is third-generation family-owned and operated and is the dominant supplier in the western U.S.

For more information, contact:
California Glass Company
155 98th Ave.
Oakland, CA 94603
tel: 510/635-7700, fax: 510/638-7624.
Pacific Coast Container, Inc.
Vancouver Commerce Park
11010 N.E. 37th Circle, Unit 110
Vancouver, WA 98682
tel: 206/892-3451, fax: 206/892-4955
Please see our ad, page 17.

◆ fp Packaging, Inc.

fp Packaging, Inc. represents a comprehensive selection of capsule styles and materials.

Sofacap's innovative seamless extruded capsules are composed of an extruded PVC top disc which is thermo-welded to a seamless body assuring the integrity of the finished capsule while providing the look of traditional tin/lead capsules.

Metalux is fp's manufacturer of polylaminated capsules and seamed PVC capsules. Metalux capsules are available in a wide range of sizes, colors, and finishes with custom printing and embossed and printed tops available.

Rivercap tin capsules are 100% recyclable and environmentally friendly, having a lead content of below 40ppm. Rivercap uses specially formulated scuff resistant inks and has unmatched precision printing capabilities. Rivercap tin capsules are available in 80 or 100 micron thickness.

For more information, contact:
fp Packaging, Inc.
601 Airpark Rd.
Napa, CA 94558
tel: 707/258-3940, fax: 707/258-3949.

◆ Fasson Roll Division

Fasson announces the market entrance of its newest wine labeling material, **Collector's Reserve™ Label**, a collection of premium facestocks featuring numerous finishes, colors, and basis weights.

"Wineries, especially the small ones," says Bret Buelo, Fasson product manager, "are interested in pressure-sensitive wine labels because they are looking at the total-applied cost for labeling. Compared to glue-applied labeling equipment, pressure-sensitive applicators are a dramatically more cost-effective capital investment."

Collector's Reserve™ Label No. 1 paperstock is the most preferred printing sheet in the domestic wine industry, providing an uncoated, eggshell white sheet with a laid finish. Printing requirements of the wine market — foil stamping, embossing, debossing, and high-quality four-color process — can be met by Collector's Reserve™ Label.

Fasson initially has matched the Collector's Reserve™ Label No. 1 sheet

with its proprietary Consumer Clean™ S-100R adhesive. Both permanent and removable, this adhesive provides secure, permanent bonding of labels to wine bottles. However, the label can be easily removed from the bottle when soaked in warm tap water (approximately 100°F) for at least two minutes. Misapplied labels can be repositioned or removed without ammonia solutions.

"The wine market is ready for Collector's Reserve™ Label," according to Buelo. "Last year, a California supplier of label application equipment sold 23 applicators to the wine market. All were pressure-sensitive applicators, and we believe this momentum will continue to build in the North American wineries."

For more information, contact:
Fasson Roll Divison
7670 Auburn Rd.
Painesville, OH 44077
tel: 216/354-7900.
Please see our ad, page 47.

◆ ENCORE!

ENCORE! offers new and resterilized wine bottles, resterilization services for most bottles from 375ml to four liters, corks, capsules, and a wide range of wine packaging materials including our pioneering A.R.M. (All Recycled Material) shipper.

Within our western geographical area, we offer the wine industry the DECANTER fully-automated system to recover wine from bottled inventory. DECANTER can process up to 280 cases/ hour and handles most cork finish bottles from 375ml to 1.5 liter. Manually-operated cork pullers are also available for small quantity decants.

Our "molded fibre" A.R.M. wine shipper, made entirely from recycled newspaper, is intended as an Earth-friendly replacement for styrofoam shippers. The shipper is available in 2, 4, 6, and 12-bottle packs. The thick paper material insulates and protects bottled wine without label abrasion. Shipping weight is similar to styrfoam and — because trays "nest" — empty units store in a minimum of space.

ENCORE! is proud of their prompt service (including picking up of used bottles from wineries), quality products, and competitive pricing.

For more information, contact:
ENCORE!
860 So. 19th St.
Richmond, CA 94804
tel: 510/234-5670
Please see our ad, page 54.

◆ Demptos Glass of California, Inc.

Established in 1981, Demptos Glass specializes in innovative packaging for the wine, spirits, and food industries. We offer a reserve line of varied colors, shapes, and sizes routinely available from Europe.

Our extensive Napa showroom allows customers to appreciate the wide range of packages available, before making a selection. Sales representatives are available to assist with technical or marketing recommendations.

What unique services distinguish Demptos Glass from the run of the mill?

A full line of colored glass, some not produced in America, includes: antique green, dead leaf green, champagne green, extra white, half-white, georgia green, amber, four shades of blue, and smoke.

Longstanding relationships with specialized overseas producers enable us to meet custom requests for unique glass shapes which remain the exclusive property of our customers.

Even without going to the luxury of custom production, our enormous selection of unusual shapes, available from producers' stocks, virtually ensures you a package fully distinct from our other customers.

We are premiere U.S. suppliers of extravagant, oversized bottles: 9-liter, 15-liter, and even up to 27-liter sizes match the tallest available around the globe.

Find out what's new in the international world of packaging. Talk to our talented representatives to learn how Demptos can serve you.

Contact:
Demptos Glass of California, Inc.
340-D Latour Ct.
Napa, CA 94558
tel: 707/224-1000, fax: 707/252-3437.

◆ Cork Supply International, Inc.

Founded in 1981, Cork Supply International has become a leading supplier of premium wine corks worldwide. Facilities are located in Benicia, CA (USA); Adelaide, South Australia; and Pacos de Brandao, Portugal.

A pioneer in offering new cork products, Cork Supply International introduced Alpha™ and Natura™ washing to the market. In addition, Cork Supply International carries traditionally washed corks, Colmated corks, and Futura II™ agglomerated corks with end discs. Recently introduced, UltraSeal™ is an advanced wax polymer cork coating.

Sparkling wine corks from Champcork are processed with the revolutionary ABC-1™ autoclave system.

Cork Supply International is a charter member of the Cork Quality Council.

For more information, contact:
Cork Supply International, Inc.
537-F Stone Rd.
Benicia, CA 94510 USA
tel: 707/746-0353, fax: 707/746-7471.

◆ Scott Laboratories Inc.

Scott Laboratories Inc. and American Fuji Seal Inc. have announced the release of their new "Environmentally Friendly" PET wine capsule.

This capsule has been reformulated to maintain the almost identical heat shrink curve as the well-known PVC capsule. This means the new "Environmentally Friendly" PET wine capsule will perform on the same bottling equipment as the PVC wine capsules have for many years. The PET capsule has been line-tested for dispensing and shrinking at speeds in excess of 350bpm.

This capsule will provide a new PET top disc which is "scuff free" during normal handling and shipment. Top disc scuffing continues to be a problem with the aluminum disc commonly

used with PVC and polylaminated aluminum capsules.

The PET capsule will be available in custom colors and have the option of custom decorating to satisfy the same needs required in current polylaminate or metal capsules. The outstanding graphics available in PET and PVC materials far exceeds the silk screening used on metal capsules. American Fuji Seal Inc. has the capability to provide a range of perforation patterns allowing the customer a wide range of easy capsule-removal options.

Scott Laboratories and American Fuji Seal will provide these capsules from the American Fuji Seal production facility in Anaheim, CA. All materials used in this product are provided by domestic suppliers.

Scott Laboratories and American Fuji Seal also provide seamless and seamed PVC capsules from the Anaheim facility. The PVC capsule is also 100% domestically supplied.

For more information, contact:
Scott Laboratories Inc.
2220 Pine View Way
Petaluma, CA 94955
tel: 707/765-6666, fax: 707/765-6674.
Please see our ads, pages 43,60.

◆ APM, Inc.

APM has added 20,000 sq.ft. to its capsule manufacturing department

which contains nine fabrication machines. APM produces PVC, polylaminate, and aluminum capsules. New features include in-line printing and hot stamping which allows for small quantity customization. Tear tabs on the capsules are available.

APM processes corks from their own company in Portugal, Cortica Benicia. Innovations recently installed bring total capacity to over 150,000,000 straight wine corks per year.

APM also distributes products from Trefinos (champagne cork), H.I.T.E. (wirehoods), MCG Closures (stelcaps and ROPP); and Vetrerie Bruni, a new association supplying Italian specialty glass bottles (APM is stocking several items and catalogs are available.)

For more information, contact:
APM, Inc.
441 Industrial Way
Benicia, CA 94510.
tel: 800/487-7555, 707/745-8060
fax: 707/745-0371.

◆ Tapp Technologies, Inc.

Tapp Technologies Inc. is a label systems specialist that exclusively serves the wineries of the USA and Canada, providing customized self-adhesive label and labelling solutions at affordable prices.

Our printing and conversion technologies are state-of-the-art. Labels are produced using Tapp's revolutionary Sanjo PO2 & PO1 UV waterless offset presses. Six color printing plus foil stamping, embossing, coating, and die cutting can all be accomplished in a single pass.

Tapp's multiple conversion offset presses exclusively use UV waterless inks. This allows Tapp to match and even exceed the high printing quality often associated with glue-applied labels, while at the same time providing wineries with the marketing and production benefits of pressure-sensitive labels.

As the exclusive North American distributor for IMPRESSTIK™ Machinery Pty. and COSTRAL S.A.™ (formally known as CLEMENS S.A.) we can also provide customized labeler solutions for your particular application requirements. Tapp's in-house engineering and service department will help wineries with equipment selection (manual to fully automatic), installation, training, and optimizing labelling performance.

Please call Tapp Technologies for information:
Head Office: 104, 6270 - 205 St.
Langley, BC, Canada
tel: 604/533-3294 or 800/533-2616
fax: 604/533-3296 or 800/533-2624;
Northwest Regional Office:
3626 River Rd. S.
Salem, OR 97302
tel: 503/585-9463, fax: 503/585-3492;
California Office: 607, 751 Laurel St.
San Carlos, CA 94070
tel: 415/366-5377, fax: 415/366-5378.
Please see our ad, page 27.

◆ fp Portocork, Inc.

fp Portocork set the standard in the cork industry with our innovation in non-chlorine NOVA corks. Our exclusive deep cleaning system creates a cork with lower polyphenols which reduces the incidence of off-flavors.

In addition to NOVA corks, fp Portocork offers natural and traditional corks. In order to provide the finest corks available, fp Portocork has established a unique three-step approach to quality: Incoming inspection on all lots, Batch codes to provide total traceability, and Final inspection before shipment to guarantee each order conforms to our customer's specifications.

fp Portocork was the first company in the United States to perform leaker and extraction tests on all major shipments.

For more information, contact:
fp Portocork
601 Airpark Rd.
Napa, CA 94558
tel: 707/258-3930, fax: 707/258-3935.
Please see our ad, page 32.

◆ Naylor Wine Cellars

Corrugated wine packaging

Wine sales can be increased with attractive and practical packaging. Even small to medium-size wineries can obtain small lots of boxes at reasonable prices. Shipment can be made directly from our stock and delivery to you will take only two to three days by UPS.

We stock, 1, 2, 3, 4-bottle gift boxes; 2, 3, 4, 6-bottle carriers; and 1, 2, 3, 4, 6, 12-bottle UPS shippers. By request, we

have now added UPS shippers for magnums, big and tall bottles, 187ml, 375ml, plus 1, 6, 12-bottle champagne.

Using bulk-packed foreign bottles? We have cases for them. New items are being added regularly — tell us what you need — we will get it for you, or we can custom-design to your specifications. We also offer printing on larger orders over 300 quantity per size.

For more information, contact:

Naylor Wine Cellars
R.D.-3, Box 424, Ebaugh Road
Stewartstown, PA 17363
tel: 717/993-2431 or 800/292-3370.

Please see our ad, page 61.

◆ VKN Nackenheim Germany

For 125 years, VKN Nackenheim (Germany) has been a leading European manufacturer of high-quality capsules. More than 10 million capsules per week are delivered to over 25 countries worldwide — an export percentage of over 60%.

Classic Cap® — Our "flagship" is the successful pure tin Classic Cap® which is an outstanding premium capsule, accepted and recognized worldwide. Classic Cap® is available as a stock capsule in various colors with attractively-priced special features.

Alumina — Alumina is our highly successful single-piece drawn aluminum capsule. Performance is comparable to a pure tin capsule, but in a medium-priced category.

Polymina — Polymina is VKN Nackenheim's "shooting star": our biggest success in Europe within the last eight months. Our high-tech polylaminate (composite) capsule is now also available in the USA. The Polymina pricing positively reflects the immense turnover of this product in Europe.

Heat Shrink Capsule — Moreover, VKN Nackenheim is also one of Europe's largest manufacturers of heat shrink capsules: PVC and polystyrol. This product is now available for U.S. bottle dimensions, tailor-made with VKN special tooling. All colors, metallized finish, perfect tearstrip.

For information, contact our nearest agent:

Enotech Corporation
attn: Peter Klipstas
PO Box 576
Palo Alto, CA 94302
tel: 415/851-2040, fax: 415/851-2034;

Pickering Winery Supply
attn: John Pickering, Kendall Pickering
888 Post St.
San Francisco, CA 94109
tel: 415/474-1588, fax: 415/474-1617;

R.L.S. Equipment Co.
attn: Bob Stollenwerk
1017 White Horse Pike
Egg Harbor, NJ 08215
tel: 609/965-0074, fax: 609/965-2509
Napa office: 800/527-0197.

Please see our ad, page 7.

◆ Cordes Printing, Inc.

Just as there are some excellent wineries on the East Coast of the United States, there is also an excellent wine label printer as well! Cordes Printing, located in Glen Rock, NJ specializes in high-quality wine labels. Whether your label requires single color, two color, or four color process printing, Cordes will print it accurately and consistently. The last label will look just as good as the first.

What makes Cordes Printing especially well-suited for wine label production is their in-house capabilities which include:

- Foil Stamping (gold, silver, and many other colors available)
- Embossing (blind, over print or combined with foil)
- Diecutting (irregularly shaped labels and neck labels)
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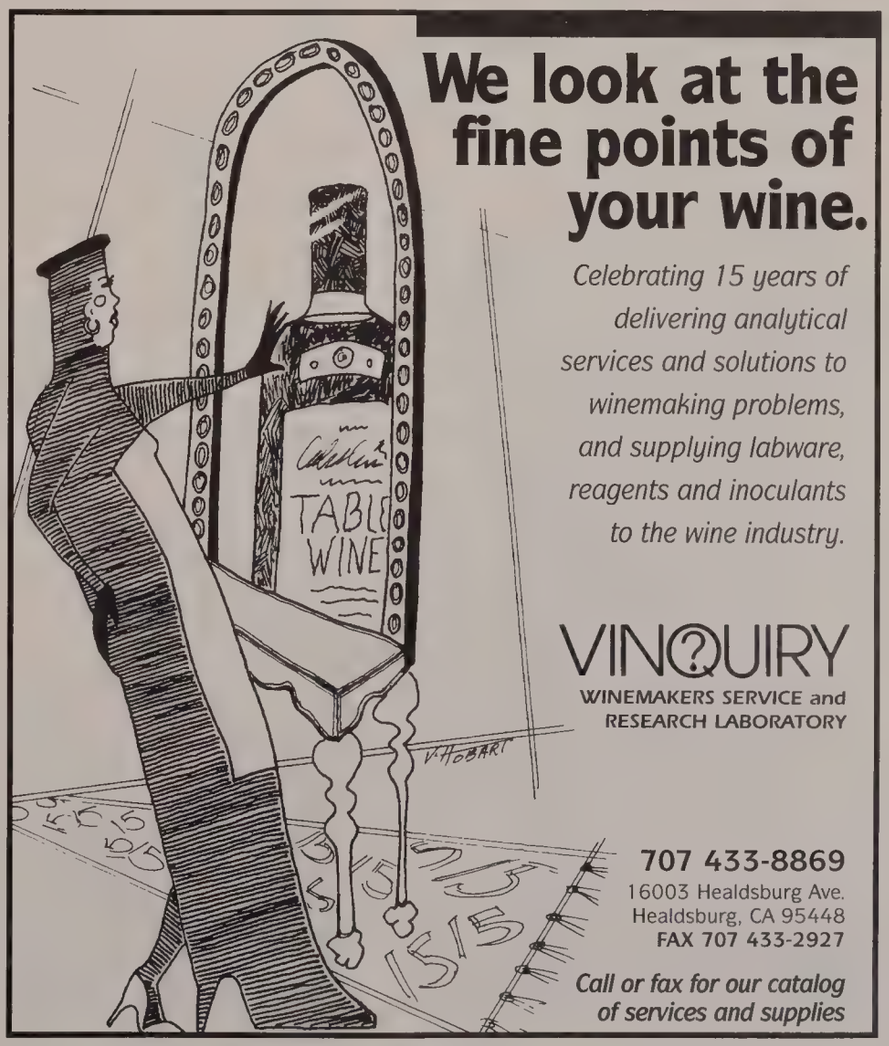
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Effects of rootstock and spacing on root distribution

Figure I
One meter by one meter grid divided into 100 10cm² sections for measuring root number and root size of different rootstocks at different soil depths. Each of the seven rootstocks at two different vine spacings were evaluated at four different sites in the experimental plot.

by Lisa D. Morano & W. Mark Kliewer
Dept. of Viticulture & Enology
University of California, Davis

Introduction

Grapevine root systems can vary in rooting depth and rooting density. How evenly and deeply roots explore within the soil profile is an important characteristic of root distribution. However, the depth where the concentration of roots is greatest and how densely or evenly roots spread within the soil profile also has significant effects on root distribution patterns.

Root distribution of grapevines is largely influenced by the rootstock cultivar and the soil environment. Soils which contain impervious layers or are chemically inhospitable will restrict root growth. This is true for clay hard pans,[12] high soil acidity,[4] and high salinity.[9]

Rooting depth is also affected by soil texture. Research in Australia has shown that vines planted on coarse-textured soils are more deeply-rooted than vines planted on fine textures.[7] In addition, fine textures and impenetrable soils cause an increase in rooting density by limiting the volume of soil the vine can explore.[7,9]

Genetic differences between rootstocks also affect the rooting characteristics of vines. Rootstocks that induce differences in above-ground vegetative vigor may also have corresponding differences in their root density.[9,11]

Some studies have suggested that the rootstock determines the density of roots, while soil environment determines the distribution within the soil profile.[10,13] However, in soils without serious limitations, patterns of root distribution also seem to vary between rootstocks.[5,7,8,11]

A replicated study of the root systems of 110R, AXR#1, and St. George (grafted to Cabernet Sauvignon) in a deep soil, found that St. George had the deepest distribution of medium (2-5mm) and large (5-12mm) diameter roots.[6] St. George also had the greatest root density per unit area of a trench wall. These results correspond with above-ground data on the rootstocks which showed that St. George had the heaviest yearly pruning weights.[6] This particular study prompted further investigation into the below-ground differences between rootstocks.

Understanding the genetic differences in root distribution patterns of grapevine rootstocks will help growers make better planting decisions. If our study established differences in root distribution patterns, and these correlated with above-ground growth, rootstocks with specific root distributions could be matched with soils for more precise management of above-ground vigor.

The effect of vine spacing on root distribution is also crucial. If closer spacing simply forces roots to distribute more deeply, using close spacing to control vigor may be an ineffective grapegrowing method.

Experimental design

In our study, trenches were dug to evaluate differences between the root density and root distribution patterns of the seven rootstocks 039-16, 110R, 3309, 1616, 5C, 420A, and AXR#1 grafted to Cabernet Sauvignon.

In addition, we hoped to determine how in-row vine spacings of one meter between vines and two meters between vines affected root density and distribution. Previous research has shown that closer vine spacing increases root density,[1,2] and causes a sharper angle of soil penetration by the roots.[1]

However, there is no replicated study showing whether closer vine spacing will induce development of a deeper root system. Therefore, the purpose of our study was twofold. First, the effect of rootstock and vine spacing on root density was assessed and compared to above-ground growth. Second, differences in the root distribution of different rootstocks and vine spacing were investigated.

Mapping the roots

This replicated study was conducted in a six-year-old rootstock trial at the University of California Oakville Experimental Vineyard. Four trenches were dug for each of the seven rootstocks at one-meter and two-meters within the vine row spacings (56 trenches total). The trenches

Table I

Rootstock	Total root number per trench	Pruning weights (lbs.)
039-16	481.1	8.1
5C	447.4	4.7
3309	430.6	7.8
AXR#1	428.2	8.2
110R	383.2	8.1
1616	327.2	6.3
420A	270.9	4.1

were dug from vine trunk to vine trunk parallel to the vine row. They were two meters deep and approximately 30cm away from the vines. Trenches were either one meter or two meters long depending on vine spacing. The distance between vine rows was four meters.

Size and location of roots which intersected the trench wall were carefully mapped onto a data sheet. To assist in the mapping of roots, a one square meter wooden frame was suspended on the trench wall (Figure I). The frame contained a grid of 100 10cm² sections. All roots were recorded in one section before moving to the next square within the grid.

One way to investigate root distribution patterns is to add all roots across the trench within a specific range of depth. These totals are then compared across rootstocks and vine spacings. For this reason, ten depth categories were created as follows (in centimeters): 0-20, 20-40, 40-60, 60-80, 80-100, 100-120, 120-140, 140-160, 160-180, 180-200. Statistical analysis cannot be conducted on data sets which have large variances, such as root numbers. The data must first be transformed. Therefore, statistics were calculated from the log of root numbers for each depth.

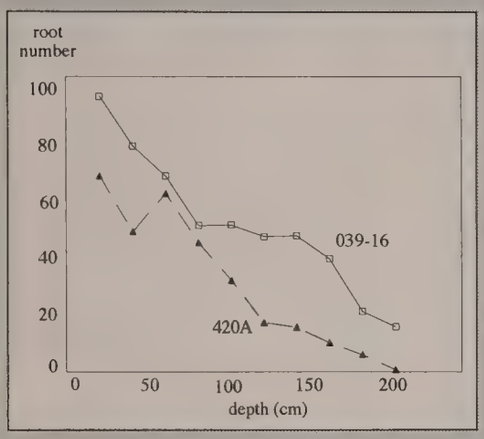

Figure II
Total root number as a function of depth for rootstocks 039-16 and 420A in Oakville, CA. Numbers represent the roots which intersected the trench wall for each depth category and are the means from four trenches two meters deep with two meters between vines.

Results: root density & vigor differences

For this study, density represents the total number of roots intersected per unit area of trench wall. Regardless of vine spacing, there was a statistical difference in the total number of roots between rootstocks ($p<0.05$). Rootstock 039-16 consistently had the largest number of roots. Rootstock 420A and (to a lesser extent) 1616 had the lowest density of roots per trench. (Table I)

To compare these root densities to above-ground vigor, pruning weights from the two vines which bordered each trench were totaled and compared. A statistical difference between rootstocks was also found for pruning weights

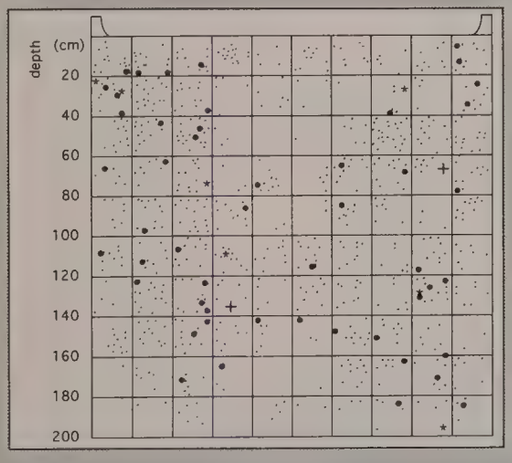

Figure III
Root map of 039-16 rootstock. Distance between vine trunks is two meters and the trench depth is two meters. Symbols represent different size categories of root diameters (· =<2mm, • = 2-5mm, * = 5-12mm, and + = >12mm).

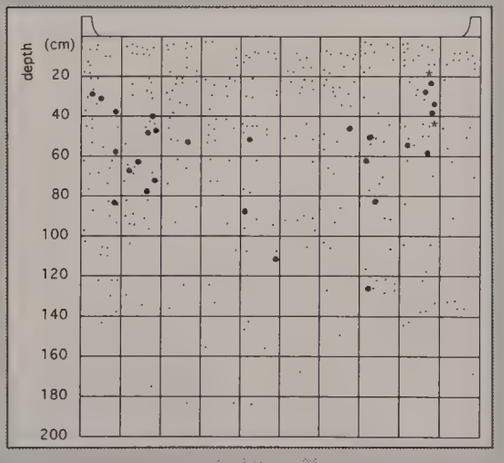

Figure IV
Root map of 420A rootstock. Distance between vine trunks is two meters and the trench depth is two meters. Symbols represent the different size categories of root diameters (· =<2mm, • = 2-5mm, * = 5-12mm, and + = >12mm).

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($p<0.001$). Rootstocks AXR#1, 039-16, 110R, and 3309 had greater pruning weights than either 5C or 420A. (Table I)

There are some consistencies between pruning weights and total numbers of roots for these rootstocks. Most significantly, 420A had the fewest roots and the lowest pruning weight. Rootstocks 039-16, 5C, 3309, AXR#1, and 110R had large numbers of roots, and all but 5C had high pruning weights. The relatively large amount of crop in relation to the total leaf areas per vine of 5C may explain this discrepancy.

Vine spacing had a significant effect on both root density and above-ground vigor. The density of roots per unit of trench area was higher for the closer spacing. The density of roots per square meter of trench was 151 for one meter spacing and 125 for two meter spacing, suggesting that vines, at closer spacing, more effectively explore the soil environment. Nevertheless, competition for resources (water, nutrients, and probably light) are reflected in lower total roots on the trench face and lower pruning weights for vines spaced one meter apart.

Root distribution differences

Roots were found to a depth of two meters in almost every trench. Therefore, the rooting depth did not differ between rootstocks or vine spacings. However, the distribution of roots within the soil profile did vary with rootstock, as shown by a significant interaction of rootstock with depth ($p<0.05$).

Statistically, 420A had a more shallow root distribution than 039-16 (Figure II). All other rootstocks had distributions between these two extremes. Nevertheless, trends in these root distribution studies suggested that 1616 and 5C also had more shallow root systems and 110R and AXR#1 had deeper distributions. Rootstock 3309 did not have a particularly deep rooting pattern, but appeared more evenly distributed in the soil profile than the other rootstocks.

Rootstock 039-16 had more roots than 420A for all depth categories below one meter. (Figure II). Root distribution maps for rootstocks 039-16 and 420A (Figures III and IV) show that 039-16 had not only a deeper total root distribution than 420A, but it had more roots of a larger diameter.

In contrast to the rootstock effect, there was no statistical effect of vine spacing on the location of roots within the soil profile, suggesting that closer vine spacing did not induce a deeper distribution of roots. Soil in this vineyard is a gravelly clay loam and is drip-irrigated several times during the summer. In more droughty soils or under dry-farming conditions, deeper root systems may occur at closer spacing.

Neutron probe readings from the vineyard also suggest that there were no differences in depth and distribution of roots between the two vine spacings. Water was removed faster from the soil with one meter vine spacing, presumably because of the higher root density. However, water was removed in the same

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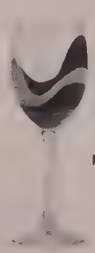

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pattern for both vine spacings down to a depth of two meters.

Summary

In this study, root density corresponded well to above ground vigor. Specifically, rootstocks with small root systems, such as 420A, had low aboveground vigor. Closer vine spacing caused competition for resources (smaller plants) and more intense soil resource utilization (higher root densities).

At the Oakville Experimental Vineyard, closer vine spacing did not induce deeper root distribution, suggesting that this may be a useful method of vigor control. Rootstock cultivar had a signficant effect on the distribution of roots, with 420A, 1616, and 5C having the most shallow root systems and 039-16, AXR#1, and 110R having deeper root systems.

We believe differences in rootstock rooting patterns will be important when making planting decisions provided that site, variety, vine spacing, and trellising have also been considered. Understanding how rootstock may affect the distribution of roots may also be important in vineyard management practices such as irrigation scheduling and cover crop selection. ■

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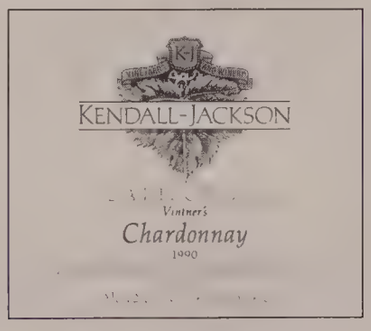

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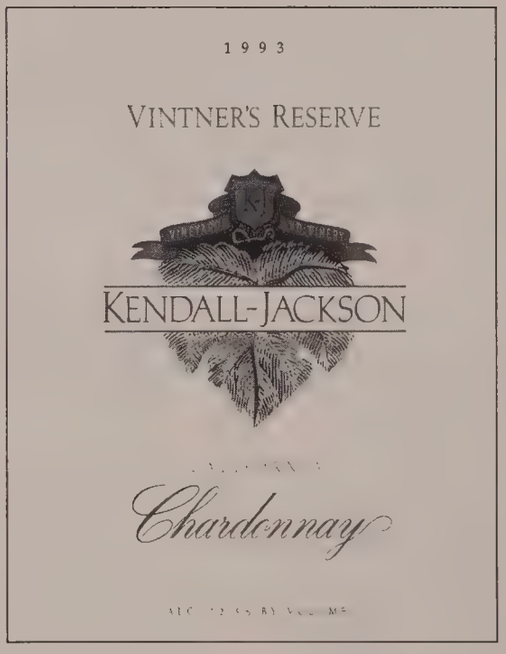

by Maureen H. Cronin

A good wine can conjure up images of fine dining, special occasions, and romantic evenings, which is why the wine bottle's image is such an important and effective consumer communications tool. The wine label represents the first perception of the wine, and protecting these labels from scuffing during shipping and distribution can be a major problem for wineries.

No one knows the value of a great package better than Kendall-Jackson Vineyards in California, which recently completed a label upgrade and needed to find an effective way of protecting its labels and bottles during shipments. They turned to fibre partitions, an alternative packaging tool from Sonoco Products Company, which has reduced label scuffing, product breakage, and excess dust.

"You can have the nicest label around," says Bob Roux, marketing director for Kendall-Jackson, "but it doesn't matter how beautiful the label is if it's scuffed when the consumer sees it. Since the label upgrade, our need to protect the label and maintain a sterling reputation became a priority."

"We put a lot of work into our label upgrade this year," adds Roux. "Sonoco partitions allowed us to maximize these efforts and keep our labels looking as good on-shelf as they did when they left the winery."

Broad distribution creates need for better packaging

National distribution accounts for more than 95% of Kendall-Jackson's sales, and the remaining 5% of the company's wines are distributed throughout Europe and Canada. Kendall-Jackson wines may travel 3,000 miles or more before reaching the consumer. In the past, the wines were shipped with corrugated partitions, which caused an unacceptable level of label scuff and pick marks. The winery was receiving complaints from its retail customers because some of the labels were unsuitable for on-shelf display.

Corrugated partitions not making the grade

"There were a lot of problems with the corrugated partitions," recalls Wes Logsdon, winery operations manager. "Because of the coarseness of the corrugated material, the labels were prone to scuffing and picking when in direct contact with the partition." He adds that the corrugated layered structure also created a great deal of dust, both in the original shipments from the glass manufacturer and in Kendall-Jackson's own distribution system.

Sonoco's partitions are not only designed to reduce label scuff, but they can also eliminate label pick. Bottles are frequently inserted into the case at an angle, which can cause label pick (label edge coming in contact with partition edge, causing it to peel away from the bottle).

Another problem with the corrugated partitions was the variance in partition size, resulting in increased bottle movement within the case and a higher rate of scuffing. In addition, the size variation of the corrugated partitions created a tendency for the partitions to fall out during the de-casing process, requiring additional labor and production time.

Passing the test

Before approaching Kendall-Jackson, the Sonoco team worked hard to determine the wine industry's packaging needs using an analytical tool called quality function deployment (QFD). The QFD process consists of focus groups and discussions with wineries, bottle producers, and retailers, enabling the Sonoco technical department to construct a battery of tests at their plant in Stockton, CA, including label scuff and pick tests, abuse testing, vibration, and rub tests. The actual testing was conducted at Sonoco's Product Development Center in Hartsville, SC.

In addition, Sonoco had to meet Kendall-Jackson's specific packaging requirements. The winery needed varying partition sizes to accommodate different bottle styles and sizes, including special edition or promotional bottles, all of which Sonoco was able to supply.

Several protective packaging options were tested by Kendall-Jackson before selecting the Sonoco fibre partitions. The initial decision to use Sonoco's partitions stemmed from the purchasing department's desire to reduce costs, but, says Purchasing Director Beth Donnelly, "At Kendall-Jackson, we look to reduce costs without sacrificing quality. We didn't know we could decrease costs and improve performance until we discovered the fibre partitions."

Donnelly adds that this discovery was made after the winery did its own test run of the partitions. In September 1992, Kendall-Jackson placed 1,200 cases with Sonoco's fibre partitions into a truck and drove the equivalent of 3,000 miles. When the cases were opened, there were no label scuffs, picks, or bottle breakage. There was virtually no settled dust, either in the original shipment from the glass manufacturer or in the winery's own distributions. Kendall-Jackson also noted a higher margin of immobility for the bottles in the case. Sonoco attributes these results to the nonabrasive recycled material used to produce the partitions and the customized fit the partitions can create.

To further reduce bottle movement, Sonoco suggested using a negative head space in the case, so that the box is slightly shorter than the bottle, meaning once the box is sealed, the bottle is immobilized until the box is opened.

"The fibre partitions are at an advantage when comparing the performance of fibre to corrugated," says Logsdon. "You can control the tolerance of fibre partitions for a tighter fit, which you cannot do with the corrugated. That makes a significant difference."

Fibre partitions do more than reduce label scuff

"The addition of a new uncaser and implementation of fibre partitions have also increased our level of bottling line efficiency by five percent," says Logsdon. The partitions, produced to tighter size specifications, are designed to stay in the case during the de-casing process. They are also coated with an adhesive called Easy-Grip®, which is applied to the edges of the partitions to prevent partition fallout during de-casing.

Sonoco's technical support teams customized the partitions, featuring a "V" notch cut into the top of the partition for smoother bottle insertion, which is not available on the corrugated partitions. The "V" notch minimizes the opportunity for label pick marks.

"Sonoco's fibre partitions allowed us to reconfigure the case to reduce the total cost of the box," adds Donnelly. "They also enabled us to produce a package that is durable and can transport the product from the winery to the consumer in pristine condition."

Packaging, according to marketing director Roux, is the single most important image issue. "We focus on the look of individual bottles instead of the look of the wines in the case. Preserving the integrity and design of that package is paramount, and we're able to do that now with Sonoco's partitions."

Logsdon has credited the partitions not only with an overall efficiency increase, but for maintaining and enhancing the recent label upgrade and quality image in the wine market. In the year since incorporating Sonoco's fibre partitions, production, marketing, and purchasing directors say their satisfaction with their new packaging program is easy to assess: "We don't get complaints anymore." ■

For more information on fibre partitions, contact Daniel Leslie, Sonoco Products Co., tel: 803/383-7476, fax: 803/383-7966.

Selling with SmellaVision

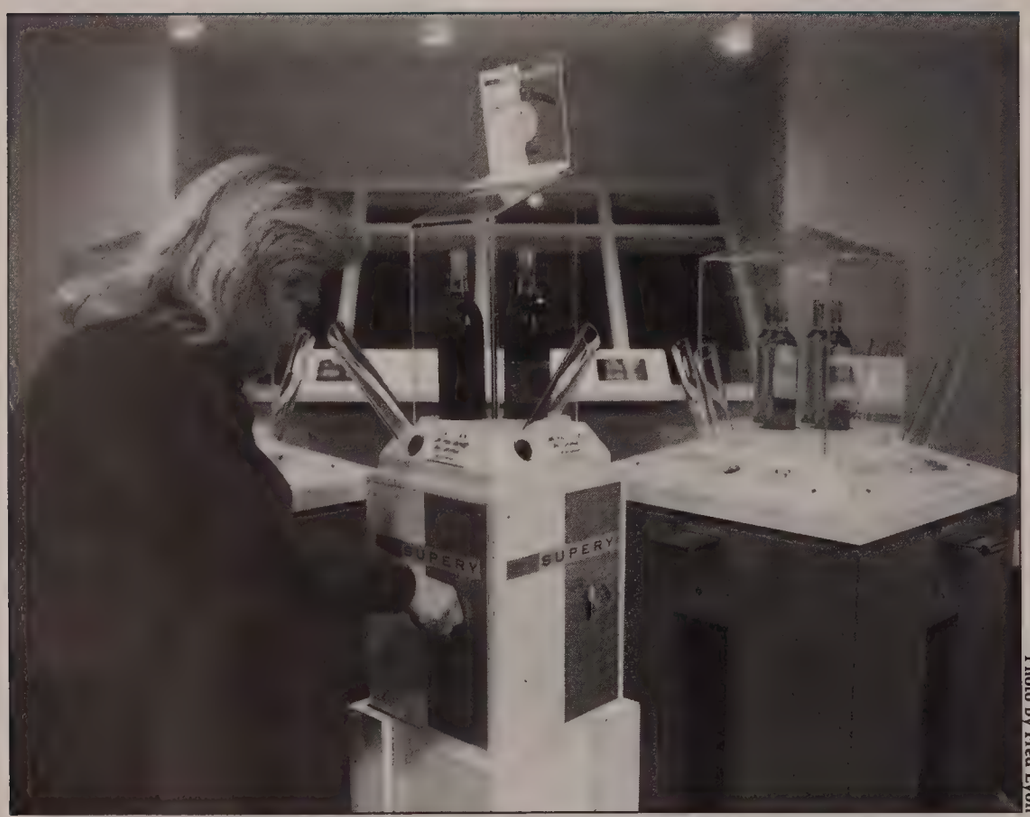

Photo by Fred Lyon

A St. Supéry visitor samples aromas from a portable SmellaVision unit. The winery's permanent SmellaVision unit is at right.

by Sandy Flanders

"SmellaVision. What a great idea! Why don't we take it on the road?" Like any idea, a marketing concept may seem brilliant and simple to execute at first, but most often it takes plain hard work and perseverance to carry the idea successfully into the marketplace. SmellaVision was such an idea, and the commitment of the staff at St. Supéry Winery in Napa Valley, CA, eventually made it a very effective marketing tool, but getting there wasn't easy.

When the St. Supéry Wine Discovery Center opened in July 1989, SmellaVision was just one of the educational exhibits designed to make the enjoyment of wine less intimidating and to involve winery visitors in more than just sipping. Illustrating the importance of sight and smell in the enjoyment of wine, the interactive SmellaVision exhibit was an immediate success.

Designed by museum architect Gordon Ashby and constructed by 360 Designers & Producers of Sacramento, CA, the two SmellaVision stations in the winery's tour gallery each feature a wine varietal and four aromas specific to that wine. In the Cabernet Sauvignon exhibit, for example, four bottles of wine, differing in color from light red to brick red, show possible color and clarity differences within wines of the same variety. Together, these demonstrations make the sensory process of evaluating wine easy to understand.

But it was the smell in SmellaVision that thrilled visitors the most. Even the most wine-experienced were fascinated with the idea of sniffing intense versions of individual aromas that might be found in wine. St. Supéry quickly became known as the home of the "sniffer machine."

To use SmellaVision, winery visitors sniff the essence of four aromas often used to describe the varietal through four separate tubes labeled as "cedar," "black pepper," "black cherry," "bell pepper," or whatever is appropriate. Visitors are prompted by the tour guide or by instructional panels to smell the intense aroma, then later to see if they can identify the more subtle version in the glass of wine during tasting.

Expanding the vision

Later, in search of a marketing concept that would convey St. Supéry's dedication to expanding wines sales through wine education, CEO Michaela Rodeno gathered her marketing team for brainstorming sessions. The germ of an idea had already been planted by restaurateur, Bob Townsend of Dingus McGee's in Colfax, CA. The interactive nature of the SmellaVision exhibit intrigued Townsend when he experienced it at the opening of the winery and Wine Discovery Center in 1989. He suggested developing a small, transportable version of SmellaVision for retailers to use in their stores. He wanted to be the "first person on the block' to introduce SmellaVision to his customers.

Originally, Rodeno thought taking SmellaVision to the people would be prohibitively expensive to implement. But St. Supéry revisited the concept after a year and a half of intensely positive visitor feedback. ("Positively unique." "I've never seen anything like it." "I learned so much." "This is really terrific.")

There were pressing questions to be addressed. What benefits would St. Supéry gain in return for the hefty investment in producing these units? Would SmellaVision appeal to the trade? Consumers loved it, but would that translate into wine sales? What would the units look like? How would they be used? Would this be just a public relations gimmick or a valuable promotion tool?

As these questions were answered, enthusiasm on the marketing team grew. Public relations could include the portable units in consumer tastings, wine education forums (such as the Society of Wine Educators conference), and vintner dinners. The sales department could provide SmellaVision for in-store promotions and sales support to interested accounts.

But first things had to come first of course. Before the marketing could begin, two goals had to be accomplished. The portable units had to be developed, and the aroma problem had to be resolved.

Armed with dictums such as "It has to be under 60 pounds" and "It has to fit in the trunk of my car," 360 Designers and Producers were assigned to create the units. The company soon came back with an acceptable design. For $25,000, St. Supéry could have 24 of its very own road-worthy SmellaVisions. The winery gave the designers the go ahead.

The smell is the thing!

Meanwhile, staff at the winery were working on the aroma problem. The original concept at the Discovery Center called for essences on cotton to be refreshed daily by staff. But a source for these aromas proved difficult to find and the staff resorted to cutting up real fruits and vegetables such as grapefruit peel, olives, and green peppers. While the aromas were perfect, this method of maintaining aromas would not work with the portable units.

Before the project could really get off the ground, a source for aromas had to be found. Phone calls to perfume companies, France, and herbalists were fruitless. Finally, winery staff contacted the Flavurence Company in Commerce, CA, which produces flavors and aromas for the food industry. John Creech, Flavurence's northern California representative, intrigued by the idea of SmellaVision, agreed to have a one-gallon sample of each essence prepared.

After a few attempts, Flavurence came up with six aromas derived from the natural sources and suitable for use in the exhibits: grapefruit and melon for Sauvignon Blanc, green apple and vanilla for Chardonnay, black cherry and cedar for Cabernet Sauvignon. Flavu-rence then suspended each concentrated essence in a clear oil base, and they were ready for sniffing.

The aromas arrived at the winery in one-gallon jugs and were transferred to glass dropper bottles to be shipped with each SmellaVision unit. When an aroma needs refreshing, usually necessary every three or four days, the person responsible simply puts two or three drops of the essential oil onto a new cotton ball and replaces the one in the machine. The system works well, unless someone decides more is better and saturates the cotton ball with the aroma.

Building the units did not go as well. After nine months, the portable SmellaVisions (heavier and bulkier than expected) were delivered and promptly sent out to eager sales representatives. Some weight considerations had been sacrificed for structural integrity, but prepublicity on the promotion was out and

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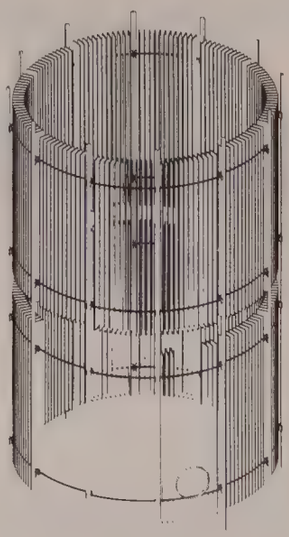

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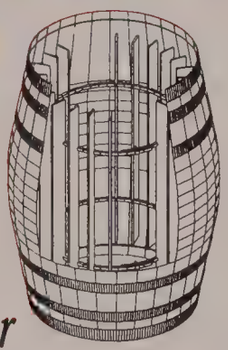

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commitments had been made. A delay seemed unthinkable, and besides, it was such a great idea, retailers would be knocking down the doors. Right? Well, not exactly.

Initial confusion

After a few weeks, however, it was obvious that sales were not meeting program expectations. What went wrong? Frustration abounded.

The marketing team, convinced of the validity of the idea and determined to make it work, analyzed obstacles to SmellaVision's success. The scrutiny indicated that some retailers thought the 'sniffer units' were a little gimmicky or silly. The sales staff was having difficulty supporting the program because the exhibits were unwieldy and fragile, and they feared the idea might be kind of 'goofy.'

When SmellaVision did get into a store or restaurant, the account was not sure quite what to do with it, how to promote it, and how to develop sales. Shoppers looked at it curiously, wondering what this object, reminiscent of a small alien space craft, was supposed to do.

The SmellaVision concept, so clear to visitors in the Wine Discovery Center, was lost on browsing wine buyers in the market place. Weak spots in construction of the units appeared. The clear plastic dome covering the wine bottles on top of the unit proved too fragile to ship or transport in a car trunk. Side panels scuffed and scarred easily in transit. Support for the project waned.

Quick fixes did not do the job, and finally it was agreed that the SmellaVisions had to be refitted and the promotion revamped to address obvious problems.

Solving the problems

The SmellaVisions were refurbished to meet consumer needs. A sign inviting shoppers to "Discover the Aromas of Wine" was set atop the plastic dome of each display. With the addition of some graphics, using SmellaVision became a guessing game. The consumer takes a whiff from the "sniffer" tube, tries to identify the aroma, then lifts a small flip-up plaque to find the correct answer. No one knows if the customer's guess is wrong. Also, 360 Designers refabricated the clear domes using thicker plastic and applied scratch-resistant clear Plexiglass protective panels to sides of the units. The modifications made the units sturdier and more attractive.

To help sell the concept and to support the retailer, a promotional kit was created that included a scientifically-based report on the importance of smell in the enjoyment of wine. A generic press release about SmellaVision's pending arrival in the store, photos of both the exhibit at the winery and the portable version, assembly instructions, other promotional ideas, and operating instructions completed the packet of information. St. Supéry sales staff and their accounts warmed immediately to this new support.

Sweet success

After reintroduction of SmellaVision, the first real success came the Castro Village Wine Co. in San Francisco, CA. Owner Boyd Swartz worked with the promotional kit to hype the event before SmellaVision's arrival at the up-scale wine boutique. Using chalk boards, banners, special tastings, and by sending a flyer to the store's mailing list, Swartz created consumer curiosity about the exhibit. Additional supplies of St. Supéry wines for the event sold through, and sales have maintained a steady flow. "This is the first really new wine education tool I've seen

in a long time," says Swartz.

A photo shoot during the Swartz promotion provided a cover story for the winery's quarterly newsletter, the *St. Supéry Chronicles*. As a direct result of this mailing, media and wine event organizers across the U.S. requested SmellaVision for their programs. Publications used SmellaVision for in-house wine education programs.

Once SmellaVisions became serious sales tools, results were gratifying. National Sales Manager Vivien Gay obtained wine placements at Wild Oats in Albuquerque and at Kelly's in Albuquerque and Santa Fe, New Mexico, on the strength of the SmellaVision promotion. "Retailers see it as being innovative and educational, and they like the tack that we are trying to set ourselves apart with this display," says Gay.

Rodeno also has SmellaVision success stories in the export market: 600£ of St. Supéry wine sold off the floor at the October 1991 London Decanter Show consumer/trade tasting. Monoprix, a French national market chain, used several SmellaVisions for a California wine promotion featuring St. Supéry.

Portable SmellaVision is in such demand that there is a waiting list for each of the 10 units dedicated to sales. In Clearwater, FL, the Cork & Bagel opened with a SmellaVision and sold 11 cases of St. Supéry in several hours. The account purchased an additional 20 cases during the promotion.

Cindy Fernandez, St. Supéry representative, got her foot in the door of B21, one of the largest Florida off-sale accounts, with SmellaVision. "There's a lot of competition for shelf space in this establishment," says Fernandez. B21 sold 15 cases in the first three hours of the promotion. A new wine club, Creative Spirits, bought 25 cases immediately for their promotion and donated a full page of their monthly newsletter to St. Supéry, SmellaVision, and the educational aspects of the exhibit.

"SmellaVision is a good sales tool on two levels," says Cheryl Ames, St. Supéry midwest regional manager. "First, it gets a retailer to place more than one bottle facing on the shelf, encouraging displays and floor stacks; and second, it serves as a curiosity for consumers, drawing their attention to St. Supéry wines amidst the multitude of available wines."

One SmellaVision was displayed in the Napa Valley Wine Train depot for five weeks (December 1993 through January 1994 — a peak tourist period in Napa Valley). St. Supéry winemaker Bob Broman hosted a winemaker dinner and the wine was featured in the Wine Train Wine Emporium throughout the promotion.

Cost Plus, a major import-export chain, fast becoming an important venue for wine sales, used SmellaVision with a Wine of the Month program for St. Supéry in November and December of 1993. The unit moved from store to store, weekend to weekend. On-site demonstrations were given by winery representatives who spent three hours in each location educating and hand-selling St. Supéry wines. The response was positive, and wine sales increased dramatically.

Kathy Ross, northern California regional sales manager, claims she would not have been able to sell into William Glen, a Sacramento retailer, without the guarantee that SmellaVision would pull through the product.

There is a distinct advantage when a chain store owner has visited the St. Supéry Wine Discovery Center and discovered the "mother" of SmellaVision, the two larger permanent aroma exhibits. Thanks to such a visit, Ross was able to put a portable unit into a Jumbo Market (Sacramento, CA) with a 10-case floor stack next to it. The wines were featured in the cold box and on the shelf. SmellaVision was in place almost six weeks and the wine sold through solidly. The chain had not carried St. Supéry before the promotion. Smella-Vision opened the account and has strengthened it, according to Ross.

SmellaVision's lessons

We can all learn some important marketing lessons from St. Supéry's SmellaVision experience. An educational program like this cannot just be dropped into a store and left to fend for itself. Sales representatives using SmellaVision must be well-trained on its purpose and use if the program is to be successful.

For example, one unit was given to a distributor representative who did not truly understand the concept. Ross arrived at a small chain store in the Sacramento area to find the unit had been set up incorrectly, without aroma essences, signs or bottles, and there were no St. Supéry wines in the store. Ross salvaged the situation but says it's vital that SmellaVision etiquette be observed to maintain the integrity of the winery's image in the marketplace.

Rodeno, pleased with the continuing success of the SmellaVision promotion, feels she gained much marketing insight from the process:

- When searching for marketing concepts, look close to home. The things most likely to best express the company's marketing strategy are the ones nearby.
- Don't be afraid to be creative. Just because it hasn't been done before or is a little out of the ordinary, don't scrap the idea.
- As part of the development process, do focused test marketing before launching the program to see if the machinery and concept will work in the real world. Find the glitches before going out into the field.
- If the idea seems valid, stick with it. There were many naysayers and much snickering when the portable SmellaVi-sions were first proposed and presented.
- Make sure that there is a company-wide focus on the program, that everyone and everything promote it.

"So many people are interested in wine and eager to learn more about it," concludes Rodeno, "and SmellaVision is fun. We think it will be a valuable marketing tool for a long time to come." ■

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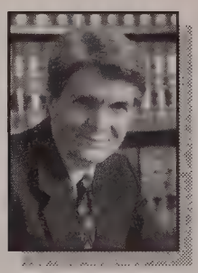

By R. Corbin Houchins

Second thoughts and secondary meaning

To the surprise of trademark lawyers and the annoyance of many vignerons, late last year a winery filed an application to register "barrel select" as its trademark for wine.

The application was surprising because it seemed unlikely that the term could designate the *source* of the wine, as distinct from the characteristic of coming from a selected barrel or group of barrels. The essence of a trademark is that it does not describe the product itself, but rather tells the consumer that any wine bearing the mark comes from (or is at least approved by) the trademark owner. A merely descriptive term, such as "fermented," would be rejected for registration by the U.S. Patent & Trademark Office.

Public and private protests followed the announcement of the application. In March of this year, the applicant abandoned the attempt, explaining to one industry member that the winery had lost sight of the impact a monopoly on the term would have had on other wineries.

When nondescript is distinctive

Could "barrel select" be a trademark? Is there any way a single industry member could acquire the exclusive right to use such a term?

The answer is "yes, but ...." To see why, one has to understand how description and indication of source are antithetical concepts. The exercise is useful in the real business world because that understanding is the first step in making a wise choice of brand name.

Terms on a product label fall along a spectrum of suitability to serve as trademarks. At the low end of the scale are the generic terms, such as "wine" itself. No one could own "Wine" brand wine because that term necessarily describes the product and thus cannot be a trademark at all. At the top end of the scale are combinations of letters that aren't really words (though they are called coined word marks) and thus couldn't describe anything. "Exxon" and "Kodak" are frequently cited examples of brand names that are pure trademarks with no descriptive aspects at all. They speak only to which producer the product comes from — its source.

Most brand names fall between those extremes. Running down from the strongest word marks, the next stop is arbitrary words, such as "Pledge" as a trademark for polish. It is a real word all right, but nothing about it describes any feature of the product. Consequently, it can serve as a strong indicator of source.

If a term on the label is not arbitrary, it presumably has some connection with the product. Thus, below arbitrary marks on the scale of legal strength are marks that do not describe the product, but suggest something about it. "Pledge" might be a suggestive mark for insurance services or a pawn shop. Suggestive marks are weaker than arbitrary marks. In practical terms, that means the owner of Pledge for polish might be able to stop a competitor from using "Promise," while an insurance company using the same mark might not.

Below suggestive marks on the spectrum are descriptive marks, which usually cannot start life as trademarks, but have to acquire the power to denote source over time by virtue of exclusive use by (or on behalf of) the brand owner. Note, however, that a descriptive mark cannot be made out of the generic term for the product. No matter how hard one tries, one cannot own a generic term — light or "lite" beer is an example of a failed attempt.

In our industry, one encounters many surnames, geographic terms, and laudatory terms, all of which are descriptive but can be protected with acquired secondary meaning. Especially annoying to new wineries named after their founders is the trademark principle, embedded in statutes, that a mark that is "primarily merely" the last name of a person cannot be registered.

Acquiring distinctiveness

So how about "barrel select"? While opinions might vary, it doesn't look generic to me. It describes a process that could be described in ways that are not identical, such as "selected by barrel." However, because it describes what the product *is*, it has no inherent power to distinguish the goods by indicating their *source*. Only if the owner's use of the mark causes the public to view it as distinctive of wine from a particular source could it function as a trademark. That isn't always an impossible task — after all, Hearty Burgundy® became a trademark only after considerable promotion caused consumers to identify it with a single winery.

The process of moving a mark from the merely descriptive to the distinctive is known as acquisition of secondary meaning. The primary meaning is the description and the secondary meaning is a product from a specific source. An exclusive user in interstate commerce has the benefit of a presumption that after five years the mark is no longer merely descriptive, so if one can keep competitors at bay for a while, the result may be a valid trademark.

In a legal proceeding, secondary meaning is typically shown by consumer survey evidence. It will surprise no one familiar with the legal system to learn that the same mark is found in surveys commissioned by the brand owner to have acquired secondary meaning and in surveys comissioned by a challenger to be merely descriptive. Litigation involving survey experts is expensive, so it is good trademark strategy not to be in the position of having to prove or disprove secondary meaning.

In the wine industry, many marks are geographically descriptive. Because they fall at the low end of the legal strength spectrum, they are dependent on secondary meaning and generally give relatively slight protection against competitors' accurately descriptive marks that differ in relatively small ways. (Sometimes they also raise regulatory issues, but that is a story for another day.)

I'll venture to guess that in the present state of public perception, "barrel select" does not have secondary meaning and that if it had not been voluntarily withdrawn, the application would have been denied. One can't be sure of such things. A few years ago, registration was granted for "blush" and a number of wineries actually paid a royalty for supposed license to use the term in a descriptive (*i.e.*, non-trademark) sense.

Lessons for brand owners

What practical lessons derive from all this? First, unless there are good marketing reasons to the contrary, select a brand name that is inherently distinctive and does not have to acquire secondary meaning before it can be your exclusive property. As a group, arbitrary or coined marks are cheaper to register and maintain than descriptive marks and afford more protection against knock-offs.

Second, if you learn that a competitor is attempting to register a term you have been using on your label, you can make your objection known not only to the applicant, but to the Patent & Trademark Office. It is more trouble to get rid of an improper registration than to defeat an improper application, so if use of a descriptive term someone is attempting to register is important to you, discuss the costs and benefits of opposition with your legal adviser.

Group standards

Interestingly, the winery that filed the application for *barrel select* as a trademark has proposed that the term be used descriptively according to agreed standards. That may or may not elicit significant interest in the trade, but it is a great entree for two close cousins of trademarks: collective marks and certification marks.

Collective marks are marks used and owned by a collective group or organization. An example is Quality Court®, used by independent members of an association of motel operators to identify motel services originating from a member of the group. The only requirement to use the mark is membership, but the association can, of course, set standards for joining that may have some bearing on the goods or services associated with the mark.

Certification marks are marks used by someone who is ***not*** the owner to certify that the user's goods or services meet standards established by the owner. Thus, they indicate not a single source, but approval in some sense by the owner of the mark. Usually they are found on goods from several sources (*e.g.* manufacturers) that have submitted their products for confirmation that they meet standards applied by the owner of the mark. The Good Housekeeping Seal of Approval is a well known example.

Wine certification marks sometimes indicate that the product meets a geographic standard other than a recognized appellation of origin. There is no logical reason why a certification mark could not certify use of a small cooperage in a certain way.

Certification marks are subject to the same requirements and potential challenges as trademarks. "Good Housekeeping Seal of Approval" is a good mark because it includes the name of a famous magazine to indicate the source of the approval, but part of it is descriptive. Except in the relatively unlikely case of Good Housekeeping's developing secondary meaning for the rest of the mark, others can use "seal of approval" marks without infringing.

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By the same token, misuse of a certification mark (*e.g.* using it descriptively) can endanger its status as a protected mark. The owners' tolerating generic use of "Escalator" and "Aspirin" rendered them usable by anyone as generic terms. A few years ago, someone challenged the Underwriters Laboratories seal on the grounds that the owner, Underwriters Labs, Inc., had used it to describe its laboratories and had not exercised quality control supervision of use of the mark. The challenge was ultimately unsuccessful, but only because the party seeking cancellation of the registration did not present sufficient evidence.

How does "barrel select" stack up as a certification mark to be owned by some organization of wineries that have agreed on a set of standards? Could that organization own the phrase so as to prevent a winery that did not meet group standards from using it? The answer is again "yes, but ...," with the difference that it might be more practical for a group to do the promotion and advertising required to achieve secondary meaning. However, the burden of influencing public perception is still considerable, and avoidance of descriptive use would require vigilence.

All in all, trademark status for "barrel select" looks like an unwieldy way to create a meaningful term for wine labels. In a future column we will look at alternatives, including regulatory rulemaking and what some commentators view as a new form of intellectual property, the indication of origin other than a recognized appellation. ■

CORRECTION

On page 70 of the May/June 1994 ***PWV***, the last paragraph should have read:

"I find that the woody-stem herbs, rosemary and thyme, work fairly well with Cabernet, but my own preferences lean to leaf herbs — tarragon, bay, and basil. Though most Cabernets have significant concentration, even if deemed approachable, you still need to be sensitive to making sure that you don't kill the wine with too many herbs in an attempt to match intensity."

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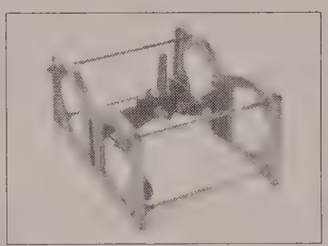

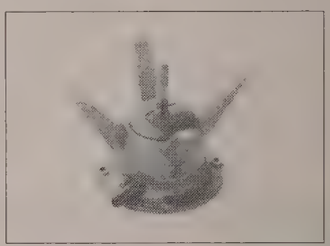

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By Dr. Richard Smart

Terroir or not terroir — that is the question

One hears increasingly the use of the word *terroir* in New World grapegrowing regions. In fact, the word seems to have become quite fashionable with many wine writers at the moment. What is *terroir*? This French word describes the particular attributes of a vineyard site.

As might be expected from the Gallic origin of the word, these attributes are considered to have much to do with the wine quality potential of the vineyard site. As far as I know, there is no exact English translation of the word.

Terroir influences include those of the "mesoclimate" and also of the vineyard soil. I use the word "mesoclimate" advisedly, to distinguish it from the regional climate (macroclimate), and the climate immediately around and within the grapevine canopy (microclimate).

Macroclimate is determined by vineyard site selection, that is, choice of a region. Microclimate is determined by a host of vineyard management procedures and also natural factors. Mesoclimate is affected by such factors as local topography, slope, aspect, elevation, distance from water bodies etc. Microclimate is influenced by mesoclimate, which in turn is but a subset of macroclimate.

The philosophy behind *terroir* is very important. If one accepts that certain high quality wines can be made only on limited vineyard sites then there would seem to be little point in planting other than these sites for quality wine production. Seeing that most of these classical sites are regarded to exist in Europe, and especially in France, this attitude could be considered to give our French friends a considerable advantage in the production of premium wine. In other words, don't bother planting Cabernet Sauvignon unless you are already in one of the best *terroirs* of the Bordeaux area!

The alternate, pragmatic, and quintessentially New World approach says that vineyard site effects are not the ultimate determinant of wine quality, but in fact wine quality can be altered by vineyard management.

The difference between these two points of view is not only philosophical. There are important commercial implications. If the former viewpoint is correct then, as previously stated, it seems of limited value to pursue quality wine grape production outside a few strictly defined *terroirs*. However, if the second viewpoint is more correct, then perhaps it is possible to reproduce, in a range of vineyard sites, those particular microclimate conditions which contribute to wine quality in the famous *terroirs*.

Terroir — How might it affect quality

There are two understandings as to how *terroir* might affect wine quality. The first is by direct effect. For example, it may be that the concentration of certain mineral elements within the soil are expressed in the juice giving the wine a particular quality advantage. Alternatively, and also directly, the soil texture and structure may affect the depth of the root zone and availability of the water which in turn could have a direct effect on fruit composition and hence wine quality.

An alternate approach is to consider indirect effects of *terroir* on wine quality. Readers will not be surprised to hear this is my preferred explanation. For example, it is my understanding of *terroir* effects that these may be attributed to factors which regulate the vigor of the vines, and in turn, depending on how the vineyard is trellised, thus affect the canopy microclimate.

The idea that a shaded canopy microclimate reduces wine quality is not new and is supported by experimental and commercial experiences worldwide. Of course, I recognize that there is also an important contribution of the vine's physiological state to wine quality and not all may be explained by canopy microclimate.

What is the French experience with terroirs?

What constitutes a quality *terroir*? The French experience is that good vineyard sites permit complete but slow maturation of the grapes. Moreover, the best quality *terroir* (grand crus) are in turn characterized by their ability to produce high quality fruit in both good years and bad years.

In fact, it is in the poor vintage years that the superiority of the grand cru vineyards are the most apparent. The factors that particularly contribute to poor quality years in Bordeaux are either extreme drought or heavy rainfall during fruit ripening. Poor quality yields are often those which are cool and overcast as well.

There are literally volumes written about the French experience with wine quality on different *terroirs*. Much of what is written is in the commercial arena, and so has a distinct marketing slant. However, there have also been some noted scientific studies.

One of the best known researchers in this area is Dr. Gerard Seguin of the University of Bordeaux. Dr. Seguin has been studying the differences between the *terroirs* of some of the famous and not so famous vineyards in the Bordeaux region for many years.

Studying the terroir effects

Dr. Seguin and his colleagues have considered the range of soil factors which can affect wine quality. In reviewing both scientific and commercial experience, they say that there is not any one single soil constituent or element which may be said to be an absolutely decisive factor in wine quality.

For example, excellent quality wines are produced on a very diverse range of geological formations from shists to chalk, limestone, marl, sandstone, granitic, and porphry soils. Many of the best vineyards of the Medoc region are on alluvial pebble sand soils.

Similarly, there seems to be no universal effect of soil reaction on wine quality. Some of the best quality vineyards of Burgundy are on alkaline soils, while others in the Medoc region near Bordeaux are on acidic soils. It is unusual for nitro-

gen-rich soils to lead to high quality.

Dr. Seguin concludes that there does not seem to be any evidence that chemical properties of the soil have a direct effect on wine quality, provided the vine does not suffer from any severe nutrient deficiency or toxicity.

Soil physical factors are regarded as being more important in affecting wine quality by Seguin and his colleagues. In the Medoc region, the majority of grand crus have soils which are sandy in nature, and contain many pebbles. Many of these soils are of low nutrient status. However, these soils are deep and allow root zones to develop to 5-7 meters deep.

Dr. Seguin has studied the water supply to vineyards in these soils in great detail. Many of these soils have a high water table which recedes progressively during the growing season. The vines are well supplied with water early, but from August onwards, as the water table drops away, water supply to the vines during fruit maturation is very dependent on rainfall. Moderate water stress is ideal for wine quality. Even when there is heavy rainfall before harvest, such sandy soils drain readily, and therefore the water stress symptoms are not immediately overcome.

Interestingly, heavy clay soils can produce a similar effect on vine water status. Such soils can have a high perched water table, and as a result have a shallow root system. The net effect is that these soils are also subject to late season water stress. Some of these soils swell when wet, and so do not take up a lot of the rainfall which can occur late in the season.

The indirect explanation

In 1980, I had the pleasure to spend several months at the INRA Station de Recherche de Viticulture in Bordeaux evaluating the vineyards of some of the famous chateaux of the region. These vineyards were trellised in a similar fashion. The great majority were high-density plantations, about 1meter x 1meter (39x39 inches), and the vines were severely trimmed with shoots about two feet long.

The high-quality vineyards were those where the soil was of lower fertility, and where soil water supply to the vine was more restricted. Vine shoot growth was restricted, especially later in the season, and shoots did not regrow after trimming. The leaves were small, and there was restricted lateral growth on these vines. In the higher vigor canopies, there was more lateral growth and larger leaves, with the net result that these canopies were more dense and hence more shaded.

These measurements and observations helped me to come to the point of view that an important component of wine quality is canopy microclimate. Readers will be aware that this viewpoint is now reinforced by research experiences in many countries of the world, including California. This leads to the idea of attempting to reproduce the canopy microclimate of the

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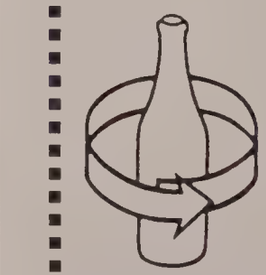

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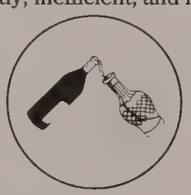

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The role of terroir in New World viticulture

Many of the Old World wine producers have developed geographical definitions of wine styles, which became codified into law. The New World approach places more emphasis on variety than place of origin. Perhaps this difference is important.

In the Old World irrigation is generally illegal, therefore the soil properties that affect water supply to the vine will have a larger effect on wine quality. It is therefore no surprise that some vineyard sites have developed quality reputations. In the New World there are no restrictions on irrigation, so soil properties are often less important.

Indeed, if one plants a vineyard in a dry climate and is able to irrigate, one has the maximum opportunity to match the water status of classical vineyard *terroirs* by appropriate irrigation management. The possibility remains of producing high quality wines by judicious irrigation and canopy management in dry climates. Wines produced from such vineyards are now developing as significant competition to Old World wines produced under the underlying philosophy of the importance of the *terroir*. ■

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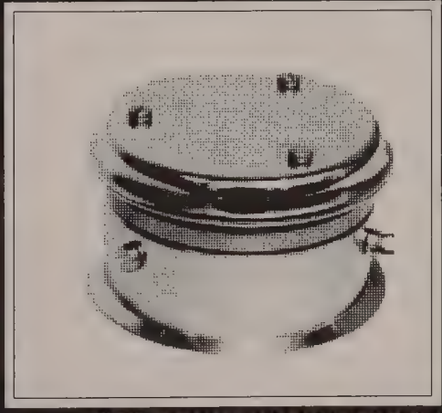

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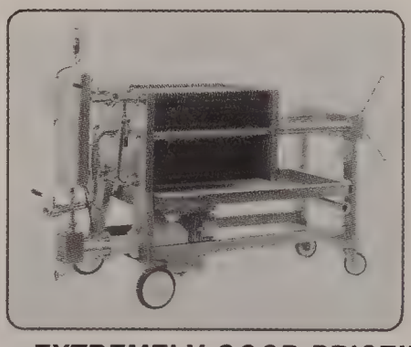

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TAPP was judged "Highly Commendable" for the 1992 Zellerbach California Cabernet Sauvignon label which is eight inches in length and produced in six colors on TAPP's SANJO PO2 UV waterless offset press. Printing, gold foil stamping, embossing, coating, and die cutting were all accomplished in a single pass. The label was designed by Steve Quirt of Chitra design in Petaluma, CA. Zellerbach applied the label to 750mL bordeaux-style bottles using Tapp's IMPRESSTIK 1000VAC label applicator.

TAPP Technologies Inc. welcomes **Paul W. Jordan** to the growing TAPP team as sales representative for Canada and northern Washington state. Paul joins the TAPP sales team of John A. Agate, California region, and J. Dennis Helser, Pacific Northwest region. Jordan will be based out of TAPP's head office in Langley, BC, Canada.

TAPP Technologies Inc. has been awarded the exclusive North American distributorship for COSTRAL S.A. of France. COSTRAL (formally known as CLEMENS S.A.) manufactures labelling, filling, and monobloc machinery for small and medium-sized wineries. TAPP's first installation of COSTRAL equipment was at Domaine de Chaberton in Langley, BC, Canada in June.

For sales information, contact: TAPP Technologies Inc., 604/533-3294 in Langley, BC; 503/585-9463 in Oregon; 415/366-5377 in California.

RADOUX opens California cooperage

Tonnellerie RADOUX U.S.A. is opening a new cooperage in Rohnert Park, CA (Sonoma County) dedicated to production of wine barrels made from American oak. The barrels will be identical to the American oak barrels coopered in Jonzac, France, by RADOUX.

The new 5,250 sq.ft. workshop began making barrels in July. American oak for 1994 production was selected by Christian Radoux in the U.S. and then air-dried 22 months in France. In the future, the company intends to season the wood at a 7,000 sq.ft. oak drying yard behind the new workshop. Clients will be able to specify requirements on a custom basis.

Initially, four French master coopers from Jonzac will produce 10 to 12 Bordeaux export style barrels daily. French tools and equipment will be utilized for the American oak production at RADOUX U.S.A. Bending and toasting are accomplished over an oak fire with emphasis on long, slow roasting of the wood. Barrel heads are assembled using the traditional Cognac method with wooden dowels.

Philippe Grasset, technical director of RADOUX, has organized the new workshop carefully to insure barrels are created in the traditional French method. Visits can be arranged later this year when the cooperage is fully established.

The Boswell Company in San Rafael, CA, distributes RADOUX barrels. For sales information, please call Jim Boswell at 415/457-3955 of fax: 415/457-0304.

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Seguin Moreau builds new cooperage

In April 1994, **Seguin Moreau, USA,** broke ground on a new state-of-the-art cooperage in southern Napa, CA, with the goal of a finished product that will be another step toward developing a wine style unique to California and America.

Construction of the 25,000 sq.ft, $5 million project marks Seguin Moreau's investment in the future of the California and American wine industry. The facility, projected to open in September, is designed exclusively for production of American oak barrels and storage of Seguin Moreau's French oak wine barrels. Formerly, American oak staves were exported to France to be coopered and returned to the U.S.

The new facility, staffed by local coopers trained in France, will produce only 5,000 American oak wine barrels/year. In 1993, the company built a wood yard in Missouri for processing, drying and curing of American oak. The Napa facility will handle the final coopering of that wood.

Following exhaustive investigation of American oak forests, Seguin Moreau believes they have found an area that produces the type of oak that meets the company's exacting quality standards. "That character will provide American winemakers with an added opportunity to develop a "truly American style" for their wines," says Alain Fouquet, Seguin Moreau, USA President.

For sales information, contact: Seguin Moreau, USA at 707/252-3408.

Lafitte erects new building

Lafitte Cork & Capsule is building a $1.5 million, 24,000 sq.ft. structure to better serve its growing clientele and will move in September 1994. The new building will include a 10,000 sq.ft. climate-controlled cork storage area and a dedicated quality control lab for cork processing and capsule evaluation. The new building site is located in Napa, CA.

Lafitte has 15 employees and supplies corks, capsules, and pressure-sensitive labels to wineries. For sales information, contact: Lafitte Cork & Capsule at 707/258-CORK.

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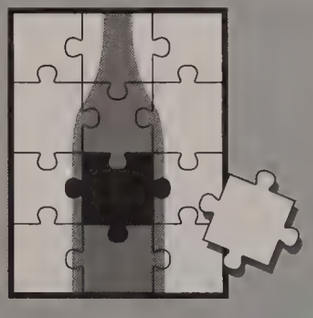

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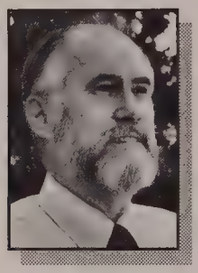

By D.R. Storm, PhD, P.E.

One crushed on the road is worth two in the tree

I am very fortunate to enjoy (almost daily) a relatively stress-free commute through rural Yolo County, CA, to my winery and engineering office. Of particular unending joy is a one-mile stretch of road lined on both sides with 6- to 8-ft. diameter black walnut trees. They were planted sometime in the early 1900s by ranchers in the area.

The massive limbs from the towering trees reach out in all directions over the road, forming a complete leaf canopy to shade passing motorists from the intense summer sun. This massive vegetative arbor provides an almost infinite habitat for large numbers of birds and squirrels, who appear to subsist wholly (or maybe in part in the case of the birds) on the abundant annual yield of walnuts. Here's how this nearly perfectly balanced system appears to work:

- *Trees produce nuts.*
- *Brisk north wind and gravity cause nuts to fall.*
- *Very dedicated human nut-gatherers harvest the highest percentage of the fallen nuts and sell to a nut broker for $5 per 50-lb. sack (used in production of ice cream and other confections).*
- *Crows harvest fallen nuts and drop on the roadway to crack the shells and reveal the nut meat (cracking a black walnut is like trying to crack a ball bearing).*
- *Autos and trucks run over black walnuts and crush same.*
- *Magpies swoop down from the trees and, between auto/truck passes, quickly grab the exposed nut meat.*
- *Squirrels carry whole nuts back up the trees to their dens (how they crack the shells is unknown).*
- *Crows screech and squawk at the magpies for stealing their auto-assisted nut-treat.*
- *Crows return to high-altitude bombing runs while magpies keep a sharp eye on the road for another direct hit by a friendly four-wheeled nut-cracker.*

The ecological moral to this story seems to be that all the players, except the crows, seem to benefit. This may be the phenomenon that ecologists call symbiosis, or one species helping another to survive.

I was feeling sorry for the crows until a local almond grower told me that a dozen crows can debilitate a ready-to-harvest almond crop at a rate of 50 lbs./acre per day! My sympathy lies with the squirrels who must spend a good part of the winter months trying to gnaw holes in those rock-like shells. From time to time, I also observe the omnivorous crows grazing in fields of recently harvested feed corn and milo (sorghum), so the nut-cracking may be only a recreational activity between crows and magpies.

PART I

Wastewater sludge: characteristics and management

Whether you call it sludge, septage, residual solids, ooze, swarf, or guck, it's what's left after all is said and done in wastewater treatment. Higher and higher degrees of treatment, mandated by continually more restrictive federal and state water pollution control laws, generally can be equated to larger and larger volumes of sludge, that will in the future require higher and higher costs for handling and disposal.

The principal sludge problem is in the municipal waste treatment category, where the per capita production of sludge is on the order of 0.3 pounds/day. For the very large megalopolis, the options for disposal narrow, while the population continues to grow. Ocean disposal, burial in a sanitary landfill and incineration all appear to have a very limited future because of environmental and social problems that are not easily mitigated.

Sludge recycling, which includes thermal treatment for pathogen inactivation and reduction in volume (dewatering), can produce a nominally useful, low-nutrient fertilizer and/or soil conditioner. The federal Resource Conservation & Recovery Act (RCRA) and its amendments contain specific guidelines on the recycling and permitted beneficial uses of sludge. They include the limiting concentrations of certain toxic heavy metals. Sludge treatment with lime has also been tested and at one period in the late 1970s was even seriously considered for vineyard soil pH neutralization in a portion of Napa's Carneros district.[3]

Small wineries and sludge

Urban wineries depend upon municipal services for waste treatment and disposal. The cost to the winery for sewerage service is incorporated into the rate structure used by the city or special district to recover its capital costs of treatment works and the annual commitment to operation and maintenance costs including sludge disposal.

Small wineries with on-site process and sanitary wastewater treatment and disposal systems are generally dependent upon commercial septic tank pumpers to periodically service their septic tanks. If the winery's process waste stream contains a screening device (gravity or rotary drum screen), the frequency of septic tank solids removal is considerably less — by 15% to 20%.[4]

It is conceivable that, with the approval and consent of the local environmental health officials and a favorable economic analysis, process wastewater sludge (septage) could be disposed of in vineyard soils. The use of winery equipment and labor would have to be balanced against the cost of commercial septic tank pumping and disposal which is approximately $300 for 2,000 gallons or less (Northern California, 1994 price levels).

Because winery process septic tank sludge is very low in solids content (probably 10% to 15%), most of what the septic tank pumper hauls to the septage treatment facility or sanitary landfill is water. An additional streamlining of the local disposal option could be the use of solar drying beds to further reduce the process sludge disposal volume. The drying beds (clay-lined or geosynthetic fabric-lined basins) would have to be used seasonally outside of the months of winter rain. Essential elements of the drying beds would include an eight to 12-inch layer of coarse sand overlaying a network of perforated pipe to collect and convey the leachate back to the septic tank system or to impervious, shallow ponds for solar evaporation.

As highlighted in previous **PWV** columns on related subjects, failure to conscientiously remove accumulated septic tank sol-

ids can result in solids carry-over to the leachfield, almost guaranteeing soil plugging and system failure, an expense that very few wineries wish to see in their annual budgets.

Contemporary wine production practice favors the use of lees filters to salvage valuable product and to reduce solids loading on waste treatment systems. In this instance, the captured lees and their filter pads become part of the solid waste category. Pomace is not, in the strict sense, a part of the sludge problem, either, but is an element of solid waste that is generally disced into vineyard soils, removed as solid waste for burial in a landfill, or composted and enriched with other solids (rice hulls, sawdust/chips, or gypsum) to become part of a useful soil amendment and nutrient source.

Sludge (aka septage) from the sanitary waste system must be removed periodically by a commercial septic tank pumper and disposed of according to applicable state and local laws and ordinances. Public safety demands that sanitary waste residuals be treated as a potential threat to public health and eliminated from any possibility of recycling.

If a winery utilizes a surface water supply as its source of potable water, water treatment standards often require processing that may include coagulation, sedimentation, filtration, and chlorination steps in order to remove unwanted turbidity and to inactivate pathogens. The settled coagulant and its entrapped mineral and organic constituents as well as the backwash from the filter, all fall loosely into the sludge category. The winery should consult with a competent sanitary engineer to develop a scheme to safely and economically handle water treatment sludge if the current system has a free discharge to a natural drainage course or storm drain system.

The pressure filter that is generally installed upstream of a vineyard drip system, also produces a backwash containing suspended inorganic and organic solids. It has been the author's experience, however, that this backwash is exempt from water pollution control regulations as coagulation (and pathogen entrapment and concentration) is not part of the process. Likewise, as most vineyard irrigation systems are groundwater sourced, the water is categorically exempt from treatment if it is to be used for potable purposes. ■

Part II of this series will discuss sludge management for large wineries which have more sophisticated waste treatment systems.

David Storm is a consulting civil/sanitary engineer, who specializes in winery utilities, and the owner of Winters Winery.

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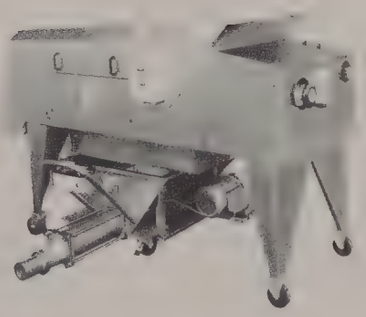

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sion; there is a critical concentration of these compounds in the cell below which cell division does not occur. It is estimated that five generations are the maximum that can be achieved by yeast initially provided with unsaturated fatty acids and sterols.

A yeast starter culture can be provided with adequate membrane lipids when grown with aeration before inoculation or by aerating the grape must when a portion of the wine yeast is reinoculated. Aeration of grape must is not necessary for properly prepared starter culture or dried yeast.

The transfer of oxygen into grape must is dependent upon temperature, sugar concentration, cellar practices, and air dispersion. For example, oxygen is much more readily dissolved in a cold liquid than in a warm liquid.

Summary

Although grape juice is a complex mix of nutrients in solution far removed from the optimum growth conditions for most strains of *Saccharomyces cerevisiae*, the winemaker can make additions to the juice to provide a more hospitable environment.

The addition of a vitamin mixture with an assimilable nitrogen supplement is usually adequate, although the exclusion of just one micro-nutrient can lead to fermentation problems. The nitrogen source can be diammonium phosphate (DAP) and/or a complex mixture containing preformed amino acids and peptides supplied as inactive yeast and their extracts, as well as supplemented B vitamins (Red Star's "Superfood" or Lalvin's "Ferm-aid"). These supplements can increase the chances that the nutrient status of the must will be adequate for yeast growth to a cell density sufficient to completely metabolize the sugar. They will also prevent formation of most of the conditions which favor accumulation of reduced sulfur compounds.

Rapid methods such as free amino nitrogen (FAN) and ammonium ion analysis do not reflect accurately the total nitrogen status of the juice, but have proven to be a useful guide to the requirement of nitrogen supplements. These two analyses are best interpreted using historical results from a given variety from a particular vineyard which may have shown fermentation problems.

It is more effective to make nutrient additions at the time of yeast inoculation or certainly before the yeast has stopped growing. Addition of nutrients to stuck fermentations is of little value unless the fermentation is to be re-inoculated, and even then efficacy is questionable as high alcohol concentration inhibits nutrient uptake.

Grape juice composition can be responsible for nutrient-deficient fermentations. However, it cannot be held responsible for improper conditions imposed by the winemaker or the lack of forethought to investigate nutrient status and additions. Careful selection of yeast strain and identifying proper fermentation conditions (including nutrient status and additions) can go a long way towards proper fermentation completion without unwanted fermentation "by-products." ■

Edited from the author's presentation at the New York Wine Workshop, March 23-25, 1994, at the New York State Agricultural Experiment Station, Cornell University, Geneva, NY.

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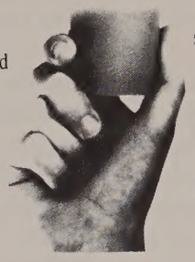

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Continued from page 16

of the WPS, and we plan to publish the proposed rule changes on Internet. This forum will be one avenue to publish and obtain comments on these changes."

As Worker Protection Program Manager of the US EPA Region Nine, Kay Rudolph has spoken to countless groups and individuals about the WPS, and she sees the new forum as a big boost to ongoing public information efforts. "We will be active participants in WPS-Forum, posting news as well as responding to questions," she says. "For employers, the delay in enforcement of some WPS requirements is an opportunity to tap the forum and other resources to gear up for living within the law."

Like other pesticide safety rules, the WPS is enforced in California by the Cal-EPA's Department of Pesticide Regulation (DPR) and by county agricultural commissioners. "It is important that employers learn all they can about WPS," says Paul Gosselin, DPR Assistant Director for Enforcement, Environmental Monitoring, and Data Management. "We've had public workshops on the new standard, and of course held training sessions for the commissioners. An electronic bulletin board is an important additional vehicle for getting the word out.

"However, it is critical that employers realize there will be a few significant differences between the nationwide WPS and how it is implemented in California. This is because California already has a strong worker protection program, and in recognition of this, the US EPA will be granting California equivalency in certain areas which are being explained and incorporated into the bulletin board.

"However, employers should remember to seek clarification from their county agricultural commissioner, who should be considered the source of interpretation and clarification of worker protection standards."

According to Rosenberg, "An electronic archive of reference documents and compliance tools that can be easily downloaded through an E-mail command will soon be attached to the bulletin board. As materials are added to the archive, announcements about them will show up in the flow of messages, along with regular participant postings of questions, answers, ideas, complaints, meeting notices, late rule developments, litigation summaries, and various other entries.

"This is what computers ought to be for. It's one small step for reinventing government and saving trees," adds Rosenberg.

The WPS-Forum is sponsored by the UC Agricultural Personnel Management Program directed by Rosenberg and the Dept. of Agricultural & Resource Economics at UC Berkeley.

To subscribe to the WPS-Forum, send the following electronic mail message to ListProc@are.berkeley.edu: "SUBSCRIBE WPS-FORUM your first name your last name" (for example: subscribe wps-forum Pete Wilson). The system will return a message confirming your subscription and providing more information about the bulletin board features. Direct phone inquiries about WPS-Forum can be made to Howard Rosenberg at 510/642-7103. ■

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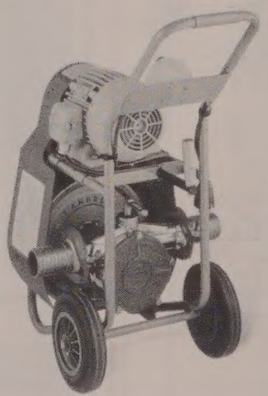

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Pechiney Cork & Seal	5	707/257-6481	707/257-8028	Bruno Humon
Pickering Supply	52	415/474-1588	415/474-1617	John Pickering
RLS Equipment	59	609/965-0074	609/965-2500	B. Stollenwerk
Rhone-Poulenc	18,19,30,31	916/549-2000	916/549-4689	Irwin Fishkin
Ruszel Woodworks	10	707/745-6979	707/745-2793	J. Allenby
Scott Laboratories	43,60	707/765-6666	707/765-6674	Bob Moeckly
Seguin Moreau, USA	64	707/252-3408	707/252-0319	Alain Fouquet
State Insurance Fund	25	800/773-7667	916/924-6825	Bob Kean
Stavin	29	415/331-7849	415/331-0516	Alan Sullivan
Stefanich/Mercier	10	415/665-1885	415/665-1883	Frank Stefanich
Sunridge Nursery	62	805/858-2237	805/366-4251	Denise Orrick
Supremecorq	3	800/794-4160	206/251-5735	Steve Burnell
Tapp Technologies	27	800/533-2616	800/533-2624	Jay Tapp
Tonnellerie Francaise	2	707/942-9301	707/942-5037	Duane Wall
Tonnellerie Radoux	12	415/457-3955	415/457-0304	Jim Boswell
VKN Nackenheim	7	Contact agents	See ad	
Vinquiry	39	707/433-8869	707/433-2927	M.A. Graff
Westec	38	707/837-7880	707/837-7888	E. Sugarman
Wine Cap Company	41	415/923-1993	415/928-0690	Dwight Pate

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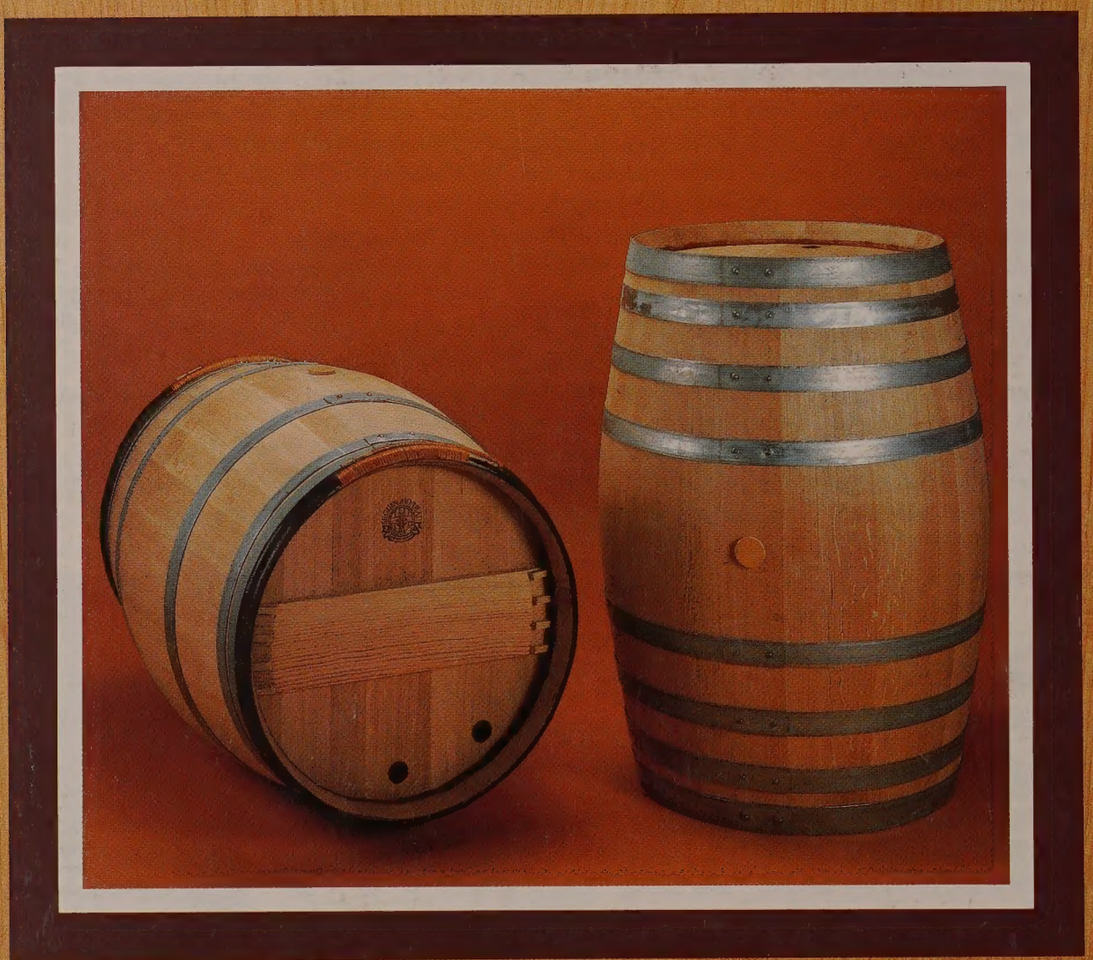
Tonnellerie



Le savoir faire

La tradition

SEGUIN MOREAU, USA

Cooperage

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